US 89 CORRIDOR PROFILE STUDY

I-40 TO UTAH STATE LINE

ADOT WORK TASK NO. MPD 013-16
ADOT CONTRACT NO. 11-013164

DRAFT CHAPTERS 1-3

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PREPARED FOR:

ARIZONA DEPARTMENT OF TRANSPORTATION

PREPARED BY:

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ACRONYMS & ABBREVIATIONS

AADT	Average Annual Daily Traffic
ADOT	Arizona Department of Transportation
ASLD	Arizona State Land Department
AZTDM	Arizona Travel Demand Model
BCA	Benefit-Cost Analysis
BLM	Bureau of Land Management
BQAZ	Building a Quality Arizona
CCTV	Closed Circuit Television
CR	Cracking Rating
DMS	Dynamic Message Sign
DCR	Design Concept Report
FY	Fiscal Year
HCRS	Highway Condition Reporting System
HERE	Real time traffic conditions database produced by American Digital Cartography Inc.
HPMS	Highway Performance Monitoring System
I-	Interstate
IRI	International Roughness Index
ITS	Intelligent Transportation System
LCCA	Life-Cycle Cost Analysis
LOS	Level of Service
LRTP	Long Range Transportation Plan
MAP 21	Moving Ahead for Progress in the 21st Century
MP	Milepost
MPD	Multimodal Planning Division
NACOG	Northern Arizona Council of Governments
NB	Northbound
NPV	Net Present Value
OP	Overpass
PES	Performance Effectiveness Score
P2P	Planning to Programming
PDI	Pavement Distress Index
PSR	Pavement Serviceability Rating
PTI	Planning Time Index
RTP	Regional Transportation Plan
SB	Southbound
SHSP	Strategic Highway Safety Plan
SR	State Route
TI	Traffic Interchange
TIP	Transportation Improvement Plan
TPTI	Truck Planning Time Index
TTI	Travel Time Index
TTTI	Truck Travel Time Index
UP	Underpass
US	United States Route
USDOT	United States Department of Transportation
V/C	Volume to Capacity Ratio
V/MT	Vehicle-Miles Travelled
WIM	Weigh-in-Motion

1.0 INTRODUCTION

The Arizona Department of Transportation (ADOT) is the lead agency for this Corridor Profile Study (CPS) of US Route 89 between the I-40 and the Utah Stateline. The study examines key performance measures relative to the US 89 Corridor, and the results of this performance evaluation are used to identify potential strategic improvements. The intent of the corridor profile program, and of ADOT's Planning-to-Programming (P2P) process, is to conduct performance-based planning to identify areas of need and make the most efficient use of available funding to provide an efficient transportation network.

ADOT has already conducted eleven CPS within three separate groupings or rounds.

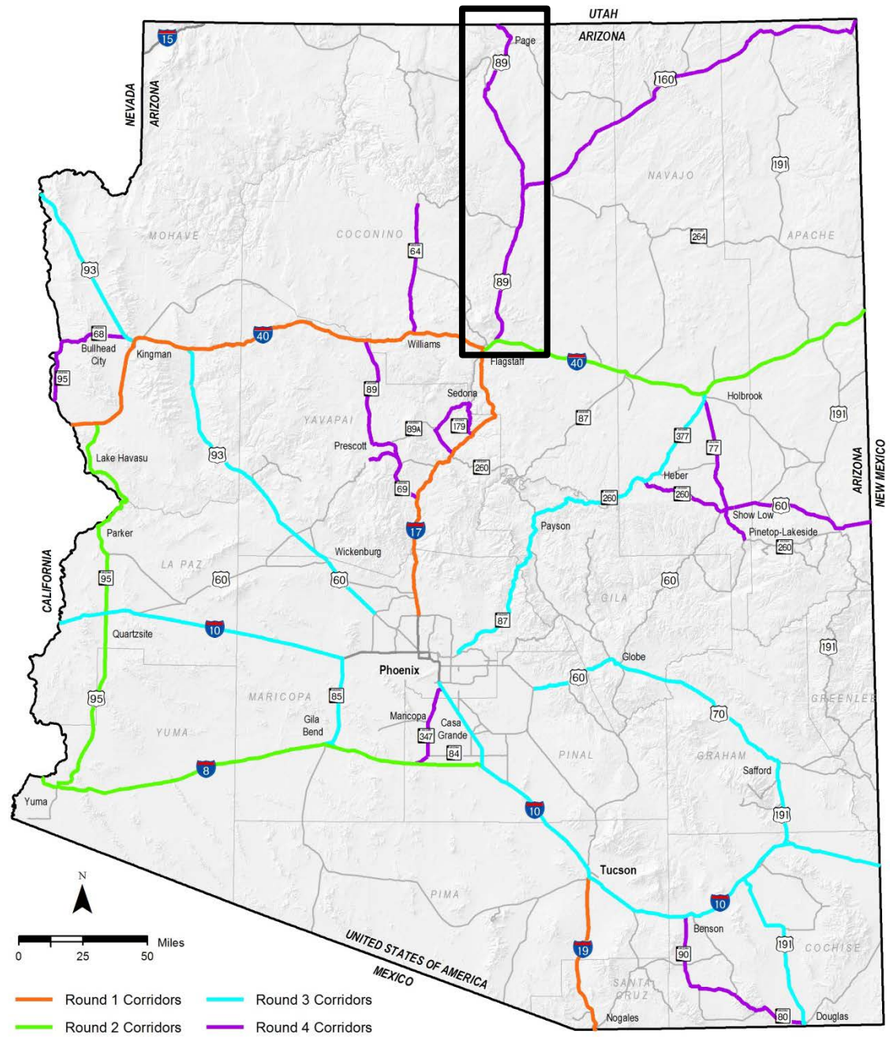
The fourth round (Round 4) of studies began in Spring 2017, and include:

- US 89: I-40 to Utah Stateline
- US 160: US 89 to New Mexico Stateline
- SR 64: I-40 to Grand Canyon National Park
- SR 68: SR 95 to US 93 and SR 95: California Stateline to Nevada Stateline
- SR 69: I-17 to SR 89; Fain Rd: SR 69 to SR 89A; SR 89A: Fain Rd to SR 89; SR 89: SR 89A to I-40
- SR 77: US 60 to SR 377
- SR 90: I-10 to SR 80 and SR 80: SR 90 to US 191
- SR 179: I-17 to SR 89A; SR 89A: SR 179 to SR 260; and SR 260: SR 89A to I-17
- SR 260: SR 277 to US 60 and US 60: SR 260 to New Mexico Stateline
- SR 347: I-10 to SR 84 and SR 84: SR 347 to I-8

The studies under this program assess the overall health, or performance, of the state's strategic highways. The CPS will identify candidate solutions for consideration in the Multimodal Planning Division's (MPD) P2P project prioritization process, providing information to guide corridor-specific project selection and programming decisions.

The US 89 Corridor, depicted in **Figure 1,** is one of the strategic statewide corridors identified and the subject of this Round 4 CPS.

Figure 1: Corridor Study Area



1.1 Corridor Study Purpose

The purpose of the CPS is to measure corridor performance to inform the development of strategic solutions that are cost-effective and account for potential risks. This purpose can be accomplished by following the process described below:

- Inventory past improvement recommendations
- Define corridor goals and objectives
- Assess existing performance based on quantifiable performance measures
- Propose various solutions to improve corridor performance
- Identify specific solutions that can provide quantifiable benefits relative to the performance measures
- Prioritize solutions for future implementation, accounting for performance effectiveness and risk analysis findings

1.2 Study Goals and Objectives

The objective of this study is to identify a recommended set of prioritized potential solutions for consideration in future construction programs, derived from a transparent, defensible, logical, and replicable process. The US 89 CPS defines solutions and improvements for the corridor that are evaluated and ranked to determine which investments offer the greatest benefit to the corridor in terms of enhancing performance. Corridor benefits can be categorized by the following three investment types:

- Preservation: Activities that protect transportation infrastructure by sustaining asset condition or extending asset service life
- Modernization: Highway improvements that upgrade efficiency, functionality, and safety without adding capacity
- Expansion: Improvements that add transportation capacity through the addition of new facilities and/or services

This study identifies potential actions to improve the performance of the US 89 Corridor. Proposed actions are compared based on their likelihood of achieving desired performance levels, life-cycle costs, cost effectiveness, and risk analysis to produce a prioritized list of solutions that help achieve corridor goals.

The following goals are identified as the desired outcome of this study:

- Link project decision-making and investments on key corridors to strategic goals
- Develop solutions that address identified corridor needs based on measured performance
- Prioritize improvements that cost-effectively preserve, modernize, and expand transportation infrastructure

1.3 Corridor Overview and Location

The US 89 Corridor provides an important northeastern connection from Flagstaff, Arizona to economic and recreational opportunities in Northern Arizona and Southern Utah, including the Navajo Nation and Hopi Tribe lands, the eastern entrance to the Grand Canyon, and onto Page and Lake Powell. US 89 is generally a two-lane undivided highway, while the first ten miles of the corridor in the vicinity of Flagstaff is a four-lane undivided highway.

The US 89 Corridor extends from Flagstaff (milepost [MP] 420) to the Utah State Line (MP 557)**.** The corridor is located ADOT's Northcentral District, two planning areas (Flagstaff Metropolitan Planning Organization [FMPO] and Northern Arizona Council of Governments [NACOG]), and Coconino County.

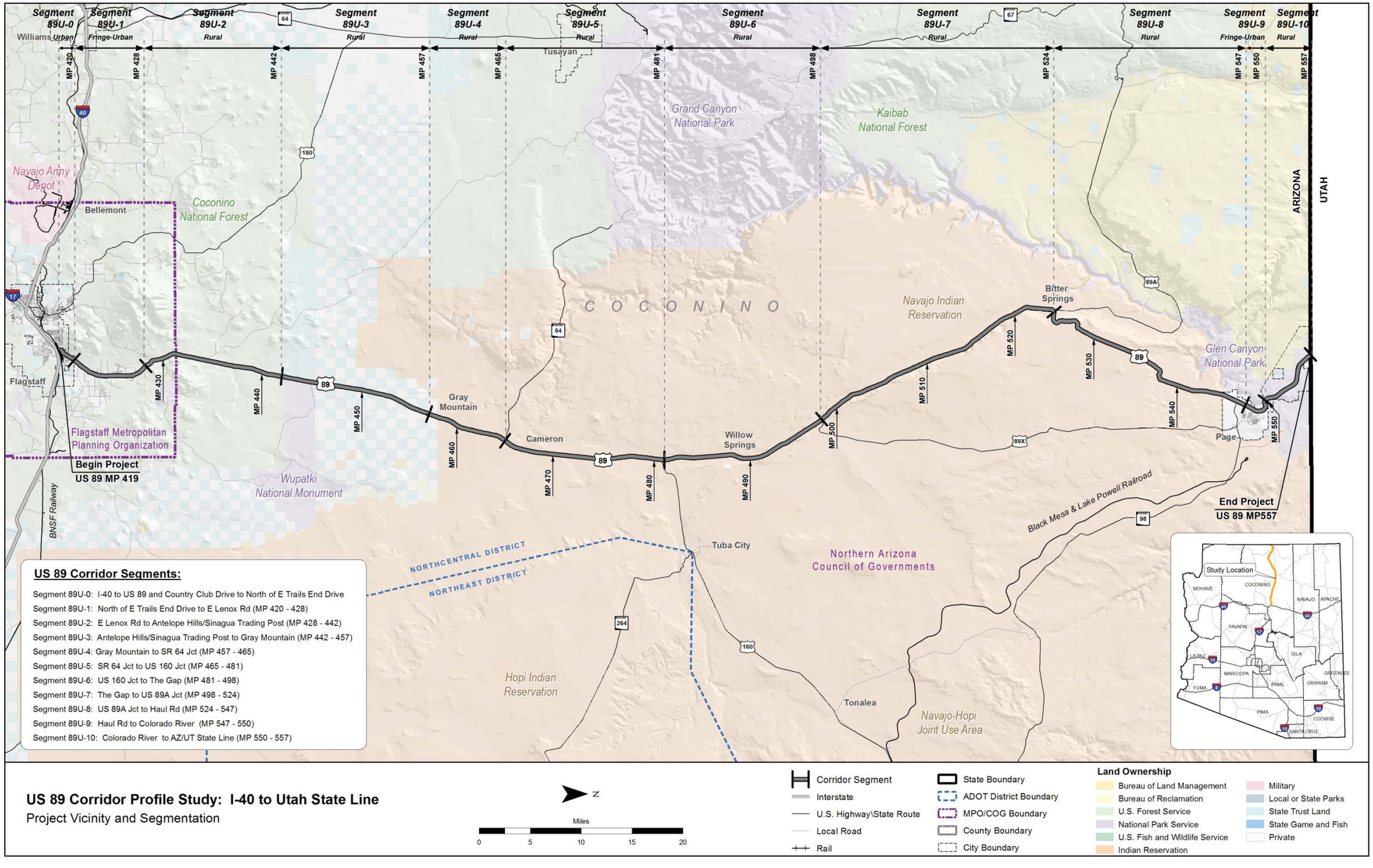
1.4 Corridor Segments

The US 89 Corridor is divided into 11 planning segments to allow for an appropriate level of detailed needs analysis, performance evaluation, and comparison between different segments of the corridor. The corridor is segmented at logical breaks where the context changes due to differences in characteristics such as terrain, daily traffic volumes, or roadway typical section. Segment 89U 0 is owned by the City of Flagstaff, all other segments are owned by ADOT. Corridor segments are described in **Table 1** and shown in **Figure 2**.

Table 1: US 89 Corridor Segments

Segment	Begin	End	Approx Begin Milepost	Approx End Milepost	Approx Length (miles)	Typical Through Lanes	2015/2035 Average Annual Daily Traffic Volume (VPD)	Character Description
89U-0	I-40/Country Club Dr	Trails End Dr on US 89	N/A	N/A	N/A	N/A	N/A	Segment 89U-0 is urban in nature and lies within the urbanized limits of Flagstaff Metropolitan Area within Coconino County. Segment 89U-0 is a partially divided facility with both portions of flush or raised medians and includes a signalized route junction with US 180/Country Club Dr./Historic Route 66, five signalized intersections, two unsignalized intersections, and various business/residential accesses. This portion of the corridor is maintained by the City of Flagstaff, therefore will not be studied in this report.
89U-1	Trails End Dr on US 89	E Lenox Rd	420	428	8	2,2	13,000/19,600	Segment 89U-1 is fringe-urban in nature and lies within the periphery of the Flagstaff Metropolitan Planning Organization boundary within Coconino County. Segment 89U-1 is an undivided facility with a flush median and has eighteen unsignalized and two signalized intersections and various business/residential accesses.
89U-2	E Lenox Rd	Antelope Hills / Sinagua Trading Post	428	442	14	2,2	6,000/11,200	Segment 89U-2 is rural in nature, within Coconino County, spanning across the Flagstaff Metropolitan Planning Organization's northern boundary. Segment 89U-2 is a divided facility and has three unsignalized intersections and various accesses to unpaved roads/trails.
89U-3	Antelope Hills / Sinagua Trading Post	Gray Mountain	442	457	15	1,1	6,900/10,900	Segment 89U-3 is rural in nature and is located within Coconino County. Segment 89U-3 is an undivided facility and has two unsignalized intersections and various accesses to unpaved roads/trails.
89U-4	Gray Mountain	SR 64 Jct.	457	465	8	1,1	6,700/10,600	Segment 89U-4 is rural in nature and is located within Coconino County. Segment 89U-4 is an undivided facility and has two unsignalized intersections and various accesses to unpaved roads/trails.
89U-5	SR 64 Jct.	US 160 Jct.	465	481	16	1,1	7,300/12,100	Segment 89U-5 is rural in nature and located within Coconino County. Segment 89U-5 is an undivided facility and has a roundabout junction with SR 64, an unsignalized route junction with US 160, and various accesses to unpaved roads/trails.
89U-6	US 160 Jct.	The Gap	481	498	17	1,1	4,000/6,000	Segment 89U-6 is rural in nature and located within Coconino County. Segment 89U-6 is an undivided facility and has various accesses to unpaved roads/trails.
89U-7	The Gap	US 89A Jct.	498	524	26	1,1	2,200/4,400	Segment 89U-7 is rural in nature and located within Coconino County. Segment 89U-7 is an undivided facility and has an unsignalized route junction with US 89A and various accesses to unpaved roads/trails.
89U-8	US 89A Jct.	Haul Rd.	524	547	23	1,1	3,500/5,400	Segment 89U-8 is rural in nature and located within Coconino County. Segment 89U-8 is an undivided facility and has two unsignalized route junction with US 89A and SR 98, one roundabout intersection, various accesses to unpaved roads/trails and a change in topography/elevation.
89U-9	Haul Rd.	Colorado River	547	550	3	1,1	5,400/8,600	Segment 89U-9 is fringe-urban in nature, is located within Coconino County, and extends adjacent to the Town of Page. Segment 89U-9 is an undivided facility and has five unsignalized intersections.
89U-10	Colorado River	AZ/UT State Line	550	557	7	1,1	5,100/8,100	Segment 89U-10 is rural in nature and located within Coconino County Segment 89U-10 is an undivided facility and has three unsignalized intersections and various unpaved roads/trails.

Figure 2: Corridor Location and Segments



1.5 Corridor Characteristics

The US 89 Corridor provides an important northeastern connection from Flagstaff, Arizona to economic and recreational opportunities in Northern Arizona and Southern Utah, including the Navajo Nation and Hopi Tribe lands, the eastern entrance to the Grand Canyon, and onto Page and Lake Powell. US 89 is generally a two-lane undivided highway, while the first ten miles of the corridor in the vicinity of Flagstaff is a four-lane divided highway.

The US 89 Corridor is envisioned to embrace rural communities, while growing in a fashion that can serve as a gateway to the City of Flagstaff. Lower densities should reign throughout the corridor; however densities will gradually increase within the Flagstaff city limits. Transportation studies have identified the northbound portion of the corridor near Flagstaff to serve as a paved shared use path.

National Context

US 89 is a major north-south, cross-country highway beginning in Flagstaff at the I-40 Junction continuing north through Utah, where it collocates with I-15, then through Idaho, Wyoming, and terminating in Montana at the Canadian border. National Geographic boasts US 89 as the #1 Driver's Drive in the world, as it curves through seven National Parks, fourteen National Monuments, and three Heritage Areas. It is often times referred to as the National Park Highway.

Regional Connectivity

US 89 crosses the mostly rural and tribal terrain of Northern Arizona. It provides the most direct and fastest link between Flagstaff and the Navajo Nation on Northern Arizona. US 89 also connects to many tourist and recreational destinations in Northern Arizona, including Sunset Crater, the eastern entrance to the Grand Canyon, Horseshoe Bend, and Lake Powell.

The corridor offers a principal highway link for freight traffic from Flagstaff to Southern Utah and beyond up to Provo and Salt Lake City. As a means to improve access for recreational travel, Utah has stated it would like to see improvements to US 89, widening the corridor to four lanes from Flagstaff to I-15 near St. George.

Total traffic volumes (AADT 2014) range from 5,000 to 28,000 throughout the length of the US 89 corridor, where the daily volumes peak on either end. The Arizona Travel Demand Model (AZTDM2) projects that traffic will more than double by 2035.

Commercial Truck Traffic

Arizona is a pass-through state for freight traffic coming from the ports of Los Angeles and Long Beach and going east to the central U.S. for distribution. ADOT conducted an extensive stakeholder outreach program during the Arizona Multimodal Freight Analysis Study.

The U.S. Department of Transportation, under Section 167(c) of title 23 United States Code (U.S.C.), created by Section 1115 of the Moving Ahead for Progress in the 21st Century Act (MAP–21), is directed to establish a National Freight Network (NFN) to assist States in strategically directing resources toward improved system performance for efficient movement of freight on the highway portion of the Nation's freight transportation system. US 89, while not designated as part of the framework, serves as a north-south link between two east-west highways of that network, I-40 in Arizona and I-70 in Utah.

Commuter Traffic

Significant commuter traffic is present on US 89, especially the segment located in Flagstaff proper, where many rural and low-density housing communities are located. 87 miles of the corridor are on the Navajo Reservation. This portion of the corridor links the reservation to Flagstaff and I-40 which sees daily commuting trips. Other population centers along the corridor, including the Utah/Arizona border experience intra-city commuter traffic on the US 89 to a much lesser degree.

Recreation and Tourism

Arizona offers a variety of recreational opportunities for its citizens as well as the millions of visitors that travel to the state in search of warmer weather, outdoor adventure, and exploration opportunities. Arizona's warm weather and natural beauty makes tourism one of the state's top industries. According to the Arizona Office of Tourism, in 2015, 42.1 million people visited Arizona who collectively spent $21 billion in the state, which supports jobs and generates tax revenue.

Recreation and tourism is a key industry along the entire corridor. US 89 serves as a popular road trip route, gaining world recognition as a destination route. Just north of Flagstaff, off of US 89 is Sunset Crater Volcano National Monument. US 89 carries on north, connecting SR 64, the eastern entrance to the Grand Canyon. The US 160 Junction connects the corridor to the Four Corners, another popular tourist destination. The northern portion of the corridor terminates in Page, where popular destinations include Lake Powell, Antelope Canyon, and Horseshoe Bend. Additionally, Flagstaff serves as a popular vacation destination year round for southern Arizona residents to escape the heat in the summer, and partake in snow activities in the winter. Additionally, Flagstaff is host to the annual Navajo Festival of Arts and Culture.

Multi-Modal Uses

Freight Rail

The Southwest Chief Amtrak route traversing the northern portion of Arizona, and going through Flagstaff shares track with freight operations and is the only rail operating near the US 89 Corridor.

Passenger Rail

Flagstaff has been identified as a potential commuter rail corridor, however ridership forecasts are not available.

Bicycles/Pedestrians

Shoulders generally average five to eight feet in width to accommodate cyclists on US 89.

Bus/Transit
Greyhound operates intercity bus transit connecting Flagstaff to Phoenix via I-17, and Albuquerque and Las Vegas via I-40. There are no Greyhound routes on US 89, however the corridor is utilized to commute to Greyhound stations. Local transit service by Mountain Line operates rural routes connecting Flagstaff to regional activity and residential centers.

Aviation
There are two airports along the US 89 Corridor, the Tuba City Airport, which is a public use airport, and the Page Municipal Airport.

Land Ownership, Land Uses, and Jurisdictions
As shown previously in **Figure 2**, US 89 crosses a few jurisdictions and land holdings throughout Coconino County. A majority of the land, nearly 87 miles, surrounding the corridor in segments 89U-4 through 89U-8 is sovereign land occupied by the Navajo and Hopi Indian Reservations. The remaining segments 89U-0 through 89U-3, and segments 89U-9 and 10 are a checkerboard of National Forest, National Monument, State Parks, Private land, and State Trust Land. All of segments 89U-0 and 89U-1, and a portion of segment 89U-2 are within Flagstaff city limits. All of segment 89U-9 and a few miles of 89U-8 is within Page city limits.

Population Centers

The US 89 Corridor runs entirely in Coconino County and is mostly rural. There are three major population centers along the corridor in Flagstaff, Page, and the Navajo Indian Reservation. Significant growth is projected to continue in the Flagstaff area. **Table 2** shows current (2015) population by county and city along with projected future (2040) population and growth

Table 2: Current and Future Population

Area	2010 Population	2015 Population	2040 Population	% Change 2010-2040	Total Growth
Coconino County	**134,421**	**141,602**	**167,897**	**25%**	**33,476**
Flagstaff	65,870	70,643	90,570	37%	24,700
Page	7,247	7,668	8,672	20%	1,425
Cameron	885	913	990	12%	105
Tuba City	8,611	8,881	9,628	12%	1,017
Unincorporated	53,567	55,236	59,856	12%	6,289

Source: U.S. Census, Arizona Department of Administration – Employment and Population Statistics

Major Traffic Generators
Much of the traffic on US 89 results from long distance personal travel. The Flagstaff region generates high volumes of traffic locally, and serves as a popular vacation destination for Arizona residents. US 89 serves as the principal gateway to the region, connecting travelers from the north to I-40, a major east-west highway; and I-17 connecting travelers to Southern Arizona. To the north, US 89 connects travelers to multiple recreational destinations, continuing through North America and terminating in Montana at the Canadian border.

Flagstaff constitutes a major employment traffic generator for commuter traffic. Segments 89U-0 and 89U-1 are located within city limits, and additionally serves rural and Native American communities outside of Flagstaff city limits.

Tribes
The Navajo and Hopi Indian Tribes are primarily located in the northern portion of Arizona, where the corridor goes through for approximately 87 miles in Segments 89U-4 through 89U-8. The Navajo people are the second-largest federally recognized tribe in the United States, populating the four corners of Arizona, Utah, Colorado, and New Mexico. The Hopi Tribe is a sovereign nation in northeastern Arizona, encompassing more than 1.5 million acres which the US 89 Corridor travels through.

Wildlife Linkages
The Arizona State Wildlife Action Plan (SWAP) provides a 10-year vision for the entire state, identifying wildlife and habitats in need of conservation, insight regarding the stressors to those resources, and actions that can be taken to alleviate those stressors. Using the Habimap Tool that creates an interactive database of information included in the SWAP, the following were identified in relation to the US 89 Corridor:

- Wildlife waters to the east and west of US 89 just north of Flagstaff
- US 89 travels through the Wupatki National Monument, Coconino National Forest, and Glen Canyon recreational Area
- The Colorado River is designated as a Riparian, which intersects the northern portion of the US 89 corridor at Segment 89U-10

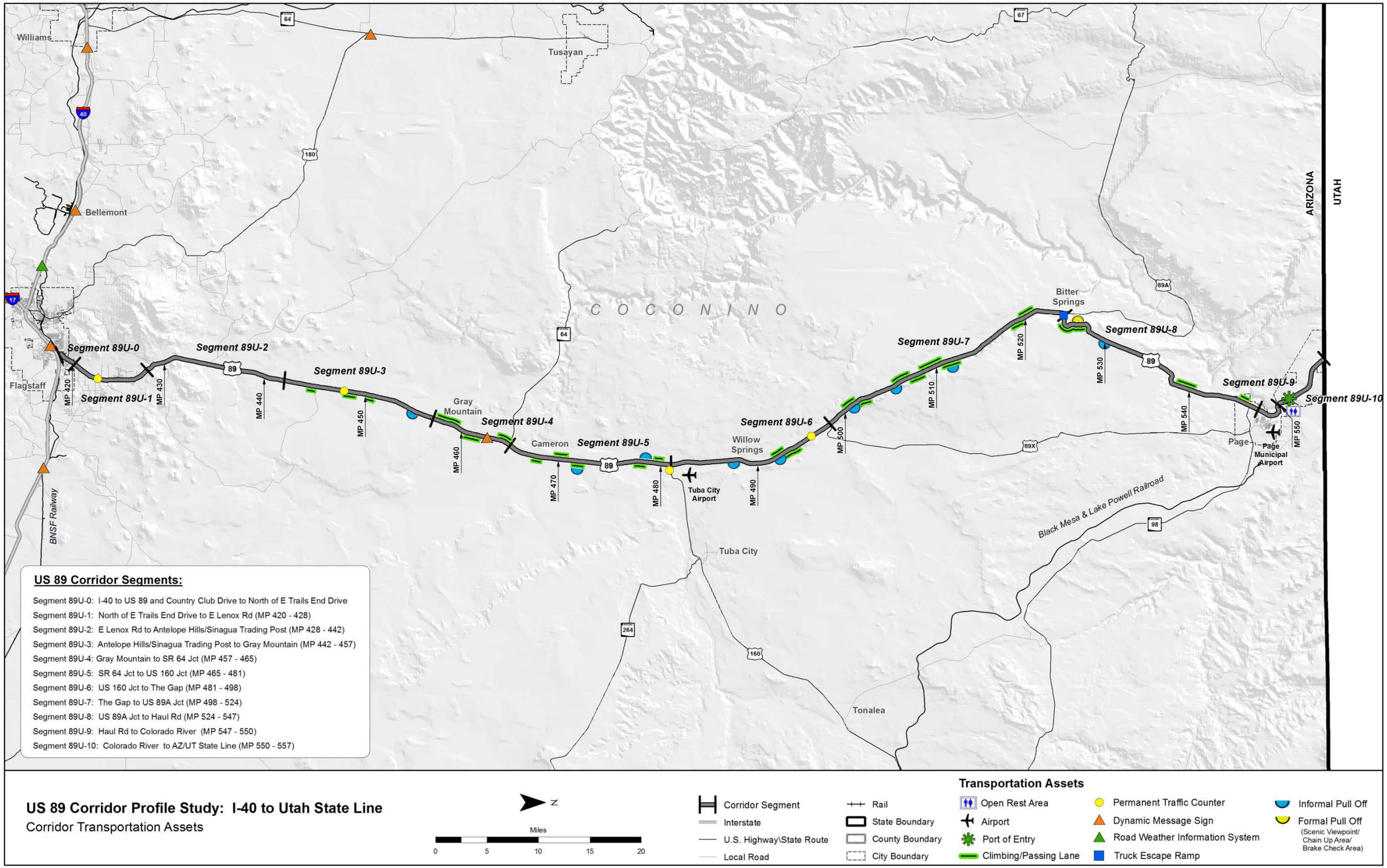
- Species of Greatest Conservation need are identified on the corridor, and increases at the southern half of the corridor and the very northern most point of the corridor near the Colorado River and Lake Powell
- A high level of Species of Economic and Recreational Importance are identified on the corridor, and increases at the southern half of the corridor and the very northern most point of the corridor near the Colorado River and Lake Powell

Corridor Assets

Corridor transportation assets of note are summarized in **Figure 3**.

Along the US 89 Corridor there are four permanent traffic counters, twenty four climbing lanes, one truck escape ramp, one dynamic message sign, and two municipal airports (one in Tuba City and one in Page). Additionally, there is a port of entry located in Segment 89U-10, just south of the Utah State Line.

Figure 3: Corridor Transportation Assets



1.6 Corridor Stakeholders and Input Process

A Technical Advisory Committee (TAC) was created that comprised of representatives from the stakeholders. TAC meetings will be held at key milestones to present results and obtain feedback. In addition, several meetings will be conducted with key stakeholders between August 2017 and January 2018 to present the results and obtain feedback.

Key stakeholders identified for this study include:

- ADOT Northcentral District
- ADOT Technical Groups
- Flagstaff Metropolitan Planning Organization (FMPO)
- Northern Arizona Council of Governments (NACOG)
- Federal Highway Administration (FHWA)

Several chapter deliverables will be developed during the course of the Corridor Profile Study. The chapters will be provided to the TAC for review and comment.

1.7 Prior Studies and Recommendations

This study identified recommendations from previous studies, plans, and preliminary design documents. Studies, plans, and programs pertinent to the US 89 Corridor were reviewed to understand the full context of future planning and design efforts within and around the study area. These studies are organized below into four categories: Framework and Statewide Studies, Regional Planning Studies, Planning Assistance for Rural Areas (PARAs) and Small Area Transportation Studies (SATS), and Design Concept Reports (DCRs) and Project Assessments (PAs).

Framework and Statewide Studies

- AASHTO U.S. Bicycle Route System, 2015 (ADOT)
- ADOT 2017-2021 State Transportation Improvement Program
- ADOT Tentative 2018-2022 State Transportation Improvement Program
- Statewide Bicycle and Pedestrian Plan Update, 2013 (ADOT)
- Climbing and Passing Lane Prioritization Study, 2015 (ADOT)
- Arizona Key Commerce Corridors, 2013 (ADOT)
- Arizona Multimodal Freight Analysis Study, 2008 (ADOT)
- Arizona Port of Entry Study, 2013 (ADOT)
- Arizona Roadway Departure Safety Implementation Plan, 2014 (ADOT)
- Arizona State Airport System Plan, 2008 (ADOT)
- Arizona State Rail Plan, 2011 (ADOT)
- Arizona Statewide Dynamic Message Sign Master Plan, 2011 (ADOT)
- Arizona Statewide Rail Framework Study, 2010 (ADOT)
- Arizona Statewide Rest Area Study, 2010 (ADOT)
- Arizona Statewide Travel Demand Model (ADOT)
- Arizona Wildlife Action Plan / Arizona Wildlife Linkages Assessment
- Building a Quality Arizona (bqAZ) Transportation Planning Framework Study (ADOT)
- Travel Management Plan, 2012 (BLM)
- What Movies You Arizona; Long Range Transportation Plan 2010-2035, 2011 (ADOT)
- Arizona Strategic Highway Safety Plan, 2014 (ADOT)
- Arizona Transparency Report, 2012 (ADOT)
- Arizona Statewide Shoulders Study, 2015 (ADOT)
- Detection and Warning Systems for Wrong-Way Driving, 2015 (ADOT)
- Arizona State Freight Plan, 2016 (ADOT)
- Pedestrian Safety Action Plan (ADOT)
- ITS Architecture Plan (ADOT)
- Low Volume Routes Study, 2017 (ADOT)
- Jason's Law Survey

Regional Planning Studies

- Regional Transportation Improvement Program FY17-23, NACOG
- Draft Regional Transportation Plan - Blueprint 2040, FMPO
- Flagstaff Regional Plan 2030
- Flagstaff Pathways 2030 Regional Transportation Plan Final Report, 2009, FMPO
- Transportation Improvement Program FY 2017 – 2021, FMPO
- Coconino County Road Capital Improvement Plan FY 2015 – 24
- Coconino County Comprehensive Plan Final Draft, 2015

Planning Assistance for Rural Areas and Small Area Transportation Studies

- Doney Park Multimodal Transportation Study Final Report, 2011

Design Concept Reports and Project Assessments

- US 89, Antelope Hills to Jct. US 160, Final Design Concept Report, 2007
- US 89, Townsend to Fernwood Pavement Preservation, Final Project Assessment, 2006
- US 89, The Gap to Cedar Ridge TP Pavement Preservation, Final Project Assessment, 2006
- US 89, Gray Mountain Northbound Passing Lanes, Final Project Assessment, 2007
- US 89, Moenkopi Wash to Hidden Springs Pavement Preservation, Final Project Assessment, 2011
- US 89A, Marble Canyon to House Rock Pavement Preservation, Final Project Assessment, 2001
- US 89A, MP 468.4 to MP 470.8 Pavement Preservation, Final Project Assessment, 2004

Summary of Prior Recommendations

Various studies and plans, including several Design Concept Reports (DCRs), have recommended improvements to the US 89 Corridor as shown in **Table 3** and **Figure 4**. They include, but are not limited to:

- Widening of numerous sections of US 89, some of which will require right-of-way acquisition. Many other proposed improvements are associated with the recommended widening:
  - General widening from Flagstaff to Utah Stateline
  - Widening shoulder in both directions from MP 421-424
  - Widen to five-lane undivided highway from MP 442.2-442.6
  - Wupatki National Monument to four-lane divided section
  - Widen to four-lane divided section from MP 445.4-456
  - Widen to four-lane with raised median and curb and gutter from MP 456.6-458.1
  - Widen to four-lane divided section from MP 458.4-464
  - Widen shoulder from MP 461.8-460.7
  - Shoulder widening from MP 469.5-470.8
- Major TI improvements at the following locations:
  - I-40 Junction TI
  - Jct. US 160 (Diamond Interchange)
- Construct passing lane at MP 463-466
- Construct passing lane from MP 477-480
- Construct new rest area near Cameron at MP 465
- US Bicycle Route 79 distinction
- Safety Improvements from MP 468.4-470.8
- Page POE Improvements
- Pavement Improvements from MP 468.4-470.8
- Construct NB Climbing Lane at MP 550-552
- Construct SB Climbing lane at MP 557-555
- Pave shoulder from MP 495-503.8
- Construct a passing lane from MP 499-502
- Proposed DMS Sign at MP 523
- Construct Dam Access Rd Sidewalk

Table 3: Corridor Recommendations from Previous Studies

Map Key Ref. #	Begin MP	End MP	Length (miles)	Project Description	Investment Category (Preservation [P], Modernization [M], Expansion [E]			Status of Recommendation			Name of Study
					P	M	E	Program Year	Project No.	Environmental Documentation (Y/N?)	
US 89											
1	419	-	-	US 89 Within Flagstaff, north of I-40 (System interchange improvements)		✓		-	N/A	N	Arizona State Freight Plan, 2016 (ADOT)
2	419	557	138	US 89 widening, Flagstaff to Utah Stateline			✓	-	N/A	N	Building a Quality Arizona (bqAZ) Transportation Planning Framework Study (ADOT)
3	419	557	138	Roadway Departure Countermeasures • Enhanced Signs and Markings for Curves (MP 428.5-429.5, 430.5-432, 525-526, 527.5-528,537.5-538) • Centerline Rumble Stripes (MP 420-430, 450-460, 470-490, 520-540) • Edge Line Rumble Stripes or Shoulder Rumble Strips (MP 420.5-424.5, 425.5-430, 430.5-4433, 434.5-435, 437-437.5, 438.5-439, 440.5-441.5, 454-455.5, 457-457.5, 458-458.5, 466-466.5, 482-482.5, 491.5-492, 494-494.5, 500-500.5, 509-510, 519.5-520, 524-526.5, 527.5-528.5,529.5-530.5, 531.5-532, 537.5-538, 540.5-541, 544-544.5) • Alignment Delineation, Lighting (MP 422-424.5, 426.5-427.5, 429-432, 443.5-444, 523.5-524, 525-526, 544-544.5) • Guardrail Relocation/Safety Enhancements (MP 527.5-528, 537-537.5)		✓		-	N/A	N	Arizona Roadway Departure Safety Implementation Plan, 2014 (ADOT)
4	420	427.22	7.22	• Construct 6’-wide sidewalks on both sides of US 89, from the end of the existing sidewalk north to Townsend-Winona Road. • Construct a paved 10’-wide shared-use path on west side of US 89 that connects to existing FUTS at Snowflake/Trails. • Construct a paved 10’-wide asphalt		✓		-	N/A	N	Doney Park Multimodal Transportation Study Final Report, 2011

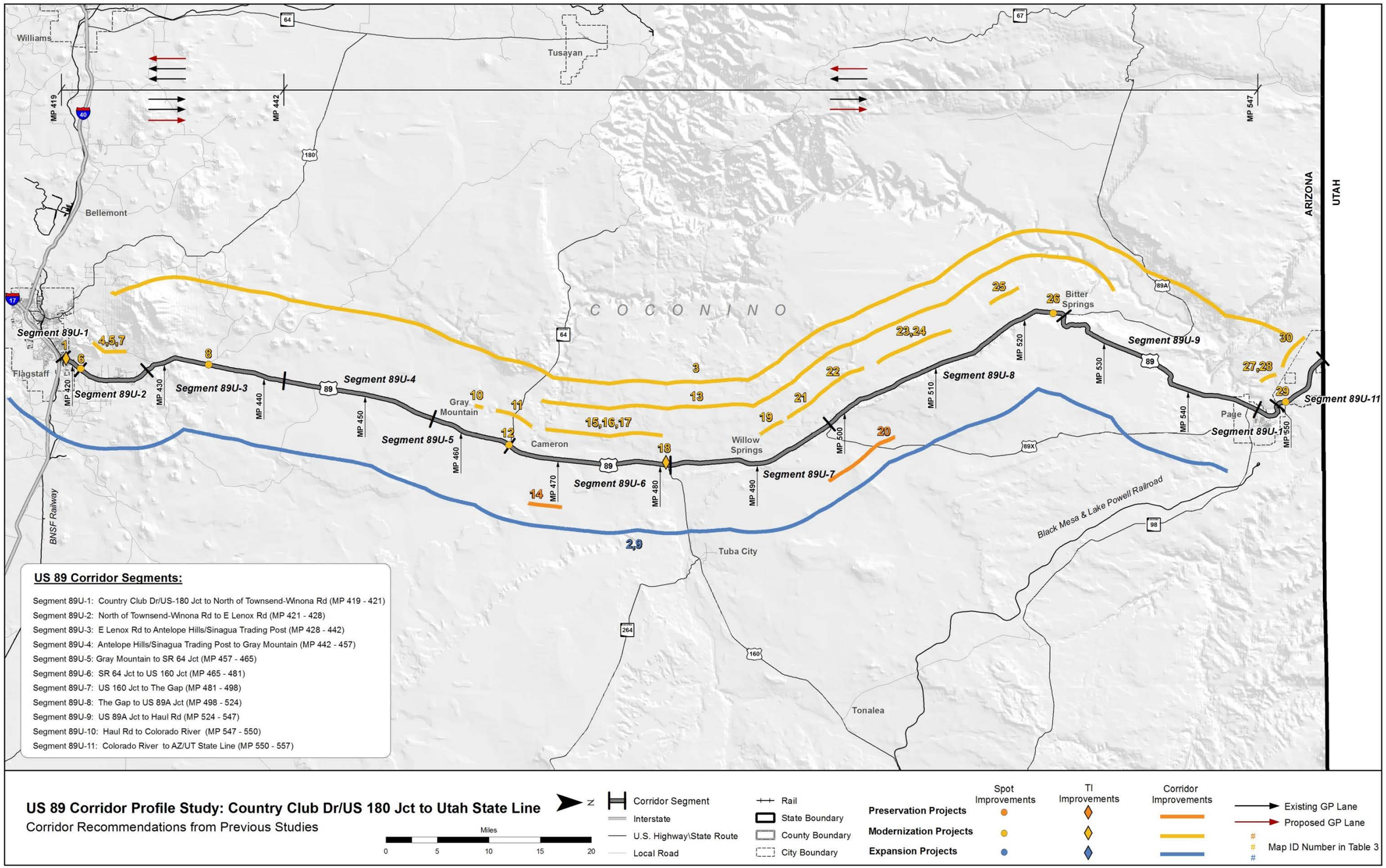
Map Key Ref. #	Begin MP	End MP	Length (miles)	Project Description	Investment Category (Preservation [P], Modernization [M], Expansion [E]			Status of Recommendation			Name of Study
					P	M	E	Program Year	Project No.	Environmental Documentation (Y/N?)	
				shared-use path Townsend-Winona Rd – Silver Saddle Rd (east/west side) • Construct a paved 10'-wide shared-use path on Silver Saddle Rd-Copeland Ln (west side) • Pedestrian and Equestrian Crossings • Restripe existing 12' travel lanes to provide paved shoulder from City Limits to Townsend-Winona Rd.							
5	420.1	420.7	0.6	MP 420.1-420.7 Pedestrian Improvements		✓		-	N/A	N	Statewide Bicycle and Pedestrian Plan Update, 2013 (ADOT)
6	421	-	-	US 89 MP 421 SB DMS Sign		✓		-	N/A	N	Arizona Statewide Dynamic Message Sign Master Plan, 2011 (ADOT)
7	421	424	3	• Widen Shoulder US 89: MP 421 - MP 424 NB • Widen Shoulder US 89: MP 424 - MP 421 SB		✓		-	N/A	N	Arizona Statewide Shoulders Study, 2015 (ADOT)
8	434.5	-	-	US 89 MP 434.5 SB DMS Sign		✓		-	N/A	N	Arizona Statewide Dynamic Message Sign Master Plan, 2011 (ADOT)
9	442.2	482	39.8	Widening Antelope Hills to five-lane undivided section (MP 442.2-442.6) Wupatki National Monument to four-lane divided section with >30 ft median (MP 443-445.4) N of Wupatki N.M. to S of Gray Mountain to four-lane divided section (MP 445.4-456) Gray Mountain to four-lane with raised median and curb and gutter (MP 456.6-458.1) Gray Mountain to Jct. SR 64 to four-lane divided section (MP 458.4-464),			✓	-	N/A	Y (EA)	US 89 Antelope Hills to Jct. US 160 MP 442 to MP 484 DCR, 2007

Map Key Ref. #	Begin MP	End MP	Length (miles)	Project Description	Investment Category (Preservation [P], Modernization [M], Expansion [E]			Status of Recommendation			Name of Study
					P	M	E	Program Year	Project No.	Environmental Documentation (Y/N?)	
				Jct. SR 64 to four-lane divided section with a raised median (MP 464-466) Jct. SR 64 to Little Colorado River to four-lane divided section with raised median (MP 466-467.1) N of Little Colorado River to Moenkopi Wash to standard four-lane divided section with a 84-foot median (MP 467.6-476.7) N of Little Colorado River to Moenkopi Wash to standard four-lane divided section with a 84-foot median (MP 467.6-476.7) Moenkopi Wash to North of Jct. US 160 to standard four-lane divided section with 84-foot median width (MP 476.7-482)							
10	461.8	460.7	1.1	Widen Shoulder US 89: MP 461.8-460.7 NB/SB		✓		-	N/A	N	Arizona Statewide Shoulders Study, 2015 (ADOT)
11	463	466	3	US 89 NB: MP463 - MP 466 Passing Lane		✓		-	N/A	N	Climbing and Passing Lane Prioritization Study, 2015 (ADOT)
12	465	-	-	New Rest Area (near Cameron)		✓		-	N/A	N	Arizona Statewide Rest Area Study, 2010 (ADOT)
13	465	524	59	U.S. Bicycle Route 79 Distinction		✓		-	N/A	N	AASHTO U.S. Bicycle Route System, 2015 (ADOT)
14	468.4	470.8	2.4	Pavement Improvements: mill and overlay roadway, shoulder build-up	✓			-	N/A	N	US 89A, MP 468.4 to MP 470.8 Pavement Preservation, Final Project Assessment, 2004
15	468.4	470.8	2.4	Safety Improvements: Add 6" epoxy striping, guard rail, recessed pavement markers, shoulder and centerline rumble strip, traffic counter system, replace delineators		✓		-	N/A	N	US 89A, MP 468.4 to MP 470.8 Pavement Preservation, Final Project Assessment, 2004
16	469.5	480	10.5	• MP 469.5-480(US-160) Pave Shoulder • Widen Shoulder US 89: MP 469.6 - MP 470.8 NB/SB Widen • Widen Shoulder US 89: MP 471.6 - MP		✓		-	N/A	N	Statewide Bicycle and Pedestrian Plan Update, 2013 (ADOT) Arizona Statewide Shoulders Study, 2015 (ADOT)

Map Key Ref. #	Begin MP	End MP	Length (miles)	Project Description	Investment Category (Preservation [P], Modernization [M], Expansion [E]			Status of Recommendation			Name of Study
					P	M	E	Program Year	Project No.	Environmental Documentation (Y/N?)	
				472.3 NB/SB Widen • Widen Shoulder US 89: MP 474.5-475.4 NB/SB							
17	477	480	3	• US 89 SB: MP480 - MP477 Passing Lane • US 89 NB: MP477 - MP480 Passing Lane		✓		-	N/A	N	Climbing and Passing Lane Prioritization Study, 2015 (ADOT)
18	480.8	-	-	Jct. US 160 (MP 480.8) Diamond Interchange		✓		-	N/A	Y (EA)	US 89 Antelope Hills to Jct. US 160 MP 442 to MP 484 DCR, 2007
19	491.7	494.4	2.7	MP 491.7-494.4 Pave Shoulder		✓		-	N/A	N	Statewide Bicycle and Pedestrian Plan Update, 2013 (ADOT)
20	495	503.8	8.8	Pavement Improvements: Overlay, pave widened turn lanes, pave turnouts	✓			-	N/A	N	US 89, The Gap to Cedar Ridge TP Pavement Preservation, Final Project Assessment, 2006
21	495	503.8	8.8	Safety Improvements: Build up shoulder, reconstruct guardrail, add striping, install recessed pavement markers, add shoulder and centerline rumble strips, replace delineators		✓		-	N/A	N	US 89, The Gap to Cedar Ridge TP Pavement Preservation, Final Project Assessment, 2006
22	499	502	3	US 89 SB: MP502 - MP499 Passing Lane		✓		-	N/A	N	Climbing and Passing Lane Prioritization Study, 2015 (ADOT)
23	505.4	512.5	7.1	MP 505.4-512.5 Pave Shoulder		✓		-	N/A	N	Statewide Bicycle and Pedestrian Plan Update, 2013 (ADOT)
24	509	512	3	US 89 NB: MP509 - MP512 Passing Lane US 89 SB: MP512 - MP509 Passing Lane		✓		-	N/A	N	Climbing and Passing Lane Prioritization Study, 2015 (ADOT)
25	518	521.2	3.2	MP 518-521.2 Pave Shoulder		✓		-	N/A	N	Statewide Bicycle and Pedestrian Plan Update, 2013 (ADOT)
26	523	-	-	US 89 MP 523 NB/SB Proposed DMS Sign		✓		-	N/A	N	Arizona Statewide Dynamic Message Sign Master Plan, 2011 (ADOT)
27	547	549.4	2.4	US 89 Industrial Rd-Dam Access Rd Sidewalk		✓		-	N/A	N	Statewide Bicycle and Pedestrian Plan Update, 2013 (ADOT)
28	550	552	2	US 89 NB: MP550 - MP552 Climbing Lane		✓		-	N/A	N	Climbing and Passing Lane Prioritization Study, 2015 (ADOT)

Map Key Ref. #	Begin MP	End MP	Length (miles)	Project Description	Investment Category (Preservation [P], Modernization [M], Expansion [E]			Status of Recommendation			Name of Study
					P	M	E	Program Year	Project No.	Environmental Documentation (Y/N?)	
29	551	-	-	Page POE Mainline Screening (weight and credential screening, cameras, signage and signals on the mainline)		✓		-	N/A	N	ADOT Key Commerce Corridors Study, 2014 Arizona Port of Entry Study, 2013 (ADOT)
30	557	555	2	US 89 SB: MP557 - MP555 Climbing Lane		✓		-	N/A	N	Climbing and Passing Lane Prioritization Study, 2015 (ADOT)

Figure 4: Corridor Recommendations from Previous Studies



2.0 CORRIDOR PERFORMANCE

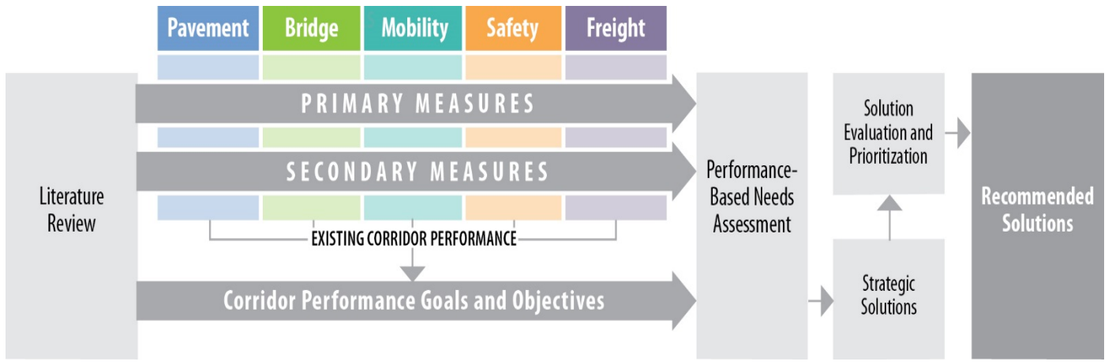
This chapter describes the evaluation of the existing performance of the US 89 Corridor. A series of performance measures is used to assess the corridor. The results of the performance evaluations are used to define corridor needs relative to the long term goals and objectives for the corridor.

2.1 Corridor Performance Framework

This study uses a performance-based process to define baseline corridor performance, diagnose corridor needs, develop corridor solutions, and prioritize strategic corridor investments. In support of this objective, a framework for the performance-based process was developed through a collaborative process involving ADOT and the CPS consultant teams.

Figure 5 illustrates the performance framework, which includes a two-tiered system of performance measures (primary and secondary) to evaluate baseline performance. The primary measures in each of five performance areas are used to define the overall health of the corridor, while the secondary measures identify locations that warrant further diagnostic investigation to delineate needs. Needs are defined as the difference between baseline corridor performance and established performance objectives.

Figure 5: Corridor Profile Performance Framework



The following five performance areas guide the performance-based corridor analyses:

- Pavement
- Bridge
- Mobility
- Safety
- Freight

These performance areas reflect national performance goals stated in *Moving Ahead for Progress in the 21st Century* (MAP-21):

- Safety: To achieve a significant reduction in traffic fatalities and serious injuries on all public roads.
- Infrastructure Condition: To maintain the highway infrastructure asset system in a state of good repair.
- Congestion Reduction: To achieve a significant reduction in congestion on the National Highway System.
- System Reliability: To improve the efficiency of the surface transportation system.
- Freight Movement and Economic Vitality: To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development.
- Environmental Sustainability: To enhance the performance of the transportation system while protecting and enhancing the natural environment.
- Reduced Project Delivery Delays: To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion.

The MAP-21 performance goals were considered in the development of ADOT's P2P process, which integrates transportation planning with capital improvement programming and project delivery. Because the P2P program requires the preparation of annual transportation system performance reports using the five performance areas adopted for the CPS, consistency is achieved in the performance measures used for various ADOT analysis processes.

The performance measures include five primary measures: Pavement Index, Bridge Index, Mobility Index, Safety Index, and Freight Index. Additionally, a set of secondary performance measures provides for a more detailed analysis of corridor performance.

Each of the primary and secondary performance measures is comprised of one or more quantifiable indicators. A three-level scale was developed to standardize the performance scale across the five performance areas, with numerical thresholds specific to each performance measure:

Good/Above Average Performance	– Rating is above the identified desirable/average range
Fair/Average Performance	– Rating falls within the identified desirable/average range
Poor/Below Average Performance	– Rating is below the identified desirable/average range

Table 4 provides the complete list of primary and secondary performance measures for each of the five performance areas.

Table 4: Corridor Performance Measures

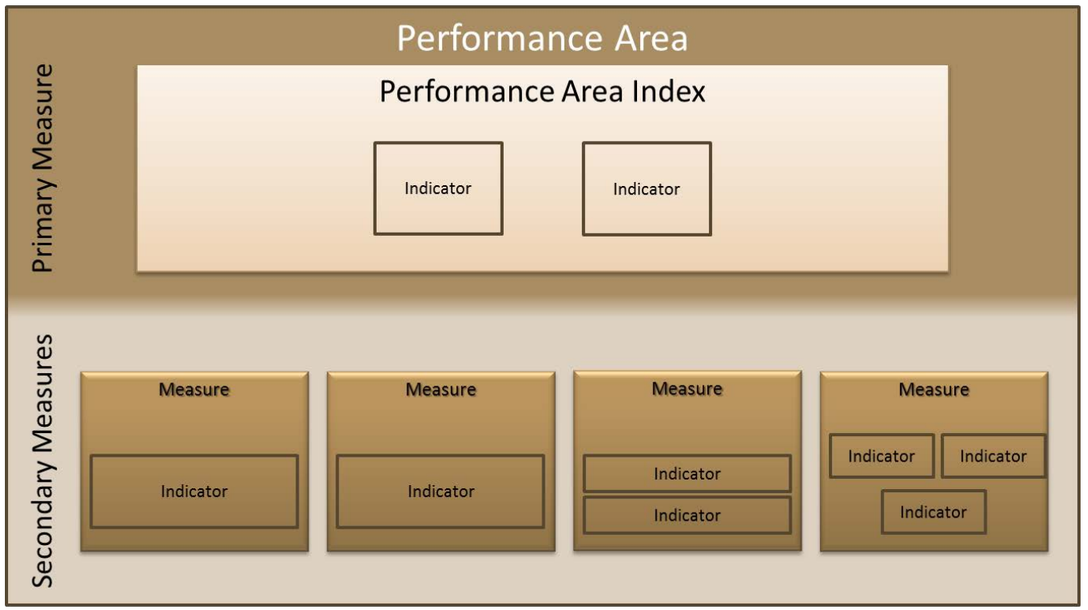
Performance Area	Primary Measure	Secondary Measures
Pavement	**Pavement Index** Based on a combination of International Roughness Index and cracking	• Directional Pavement Serviceability • Pavement Failure • Pavement Hot Spots
Bridge	**Bridge Index** Based on lowest of deck, substructure, superstructure and structural evaluation rating	• Bridge Sufficiency • Functionally Obsolete Bridges • Bridge Rating • Bridge Hot Spots
Mobility	**Mobility Index** Based on combination of existing and future daily volume-to-capacity ratios	• Future Congestion • Peak Congestion • Travel Time Reliability • Multimodal Opportunities
Safety	**Safety Index** Based on frequency of fatal and incapacitating injury crashes	• Directional Safety Index • Strategic Highway Safety Plan Emphasis Areas • Crash Unit Types • Safety Hot Spots
Freight	**Freight Index** Based on bi-directional truck planning time index	• Recurring Delay • Non-Recurring Delay • Closure Duration • Bridge Vertical Clearance • Bridge Vertical Clearance Hot Spots

The general template for each performance area is illustrated in **Figure 6**.

The guidelines for performance measure development are:

- Indicators and performance measures for each performance area should be developed for relatively homogeneous corridor segments
- Performance measures for each performance area should be tiered, consisting of primary measure(s) and secondary measure(s)
- Primary and secondary measures should assist in identifying those corridor segments that warrant in-depth diagnostic analyses to identify performance-based needs and a range of corrective actions known as solution sets
- One or more primary performance measures should be used to develop a Performance Index to communicate the overall health of a corridor and its segments for each performance area; the Performance Index should be a single numerical index that is quantifiable, repeatable, scalable, and capable of being mapped; primary performance measures should be transformed into a Performance Index using mathematical or statistical methods to combine one or more data fields from an available ADOT database
- One or more secondary performance measure indicators should be used to provide additional details to define corridor locations that warrant further diagnostic analysis; secondary performance measures may include the individual indicators used to calculate the Performance Index and/or “hot spot” features

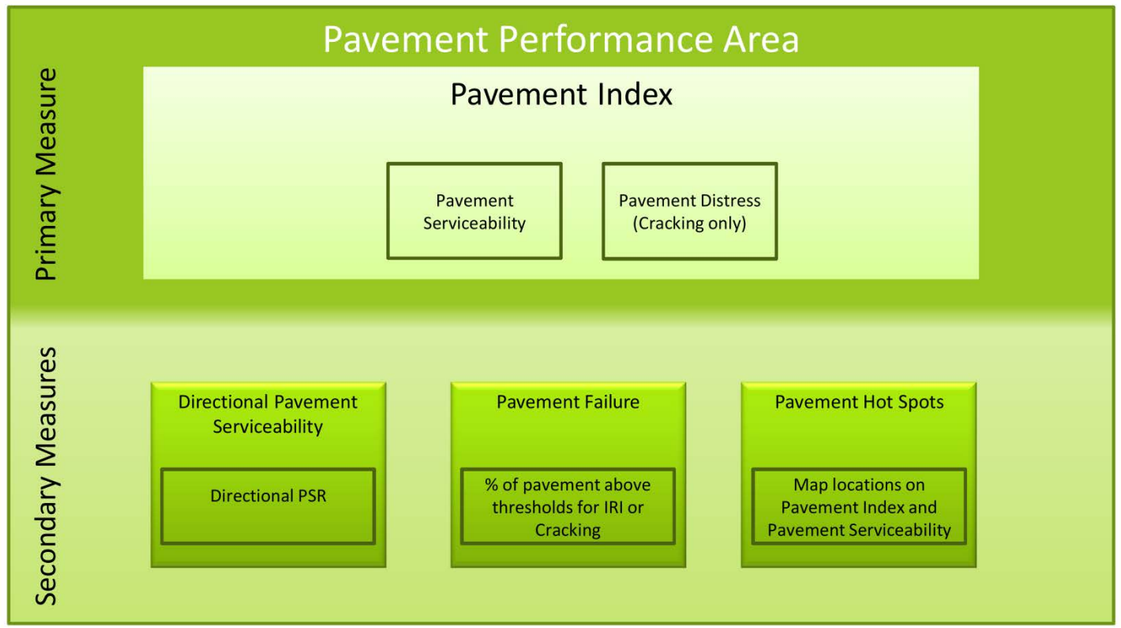
Figure 6: Performance Area Template



2.2 Pavement Performance Area

The Pavement Performance Area consists of a primary measure (Pavement Index) and three secondary measures, as shown in **Figure 7**. These measures assess the condition of the existing pavement along the US 89 Corridor. The detailed calculations and equations developed for each measure are available in **Appendix B** and the performance data for this corridor is contained in **Appendix C.**

Figure 7: Pavement Performance Measures



Primary Pavement Index

The Pavement Index is calculated using two pavement condition ratings: the Pavement Serviceability Rating (PSR) and the Pavement Distress Index (PDI).

The PSR is extracted from the International Roughness Index (IRI), a measurement of pavement roughness based on field-measured longitudinal roadway profiles. The PDI is extracted from the Cracking Rating (CR), a field-measured sample from each mile of highway.

Both the PSR and PDI use a 0 to 5 scale with 0 representing the lowest performance and 5 representing the highest. The Pavement Index for each segment is a weighted average of the directional ratings based on the number of travel lanes. Therefore, the condition of a section with more travel lanes will have a greater influence on the resulting segment Pavement Index than the condition of a section with fewer travel lanes.

Each corridor segment is rated on a scale with other segments in similar operating environments. Within the Pavement performance area, the relevant operating environments are designated as interstate and non-interstate segments. For the US 89 Corridor, the following operating environments were identified:

- Non-interstate

Secondary Pavement Measures

Three secondary measures provide an in-depth evaluation of the different characteristics of pavement performance.

Directional Pavement Serviceability

- Weighted average (based on number of lanes) of the PSR for the pavement in each direction of travel

Pavement Failure

- Percentage of pavement area rated above failure thresholds for IRI or Cracking

Pavement Hot Spots

- A Pavement “hot spot” exists where a given one-mile section of roadway rates as being in “poor” condition
- Highlights problem areas that may be under-represented in a segment average. This measure is recorded and mapped, but not included in the Pavement performance area rating calculations

Pavement Performance Results

The Pavement Index provides a high-level assessment of the pavement condition for the corridor and for each segment. The three secondary measures provide more detailed information to assess pavement performance.

Based on the results of this analysis, the following observations were made:

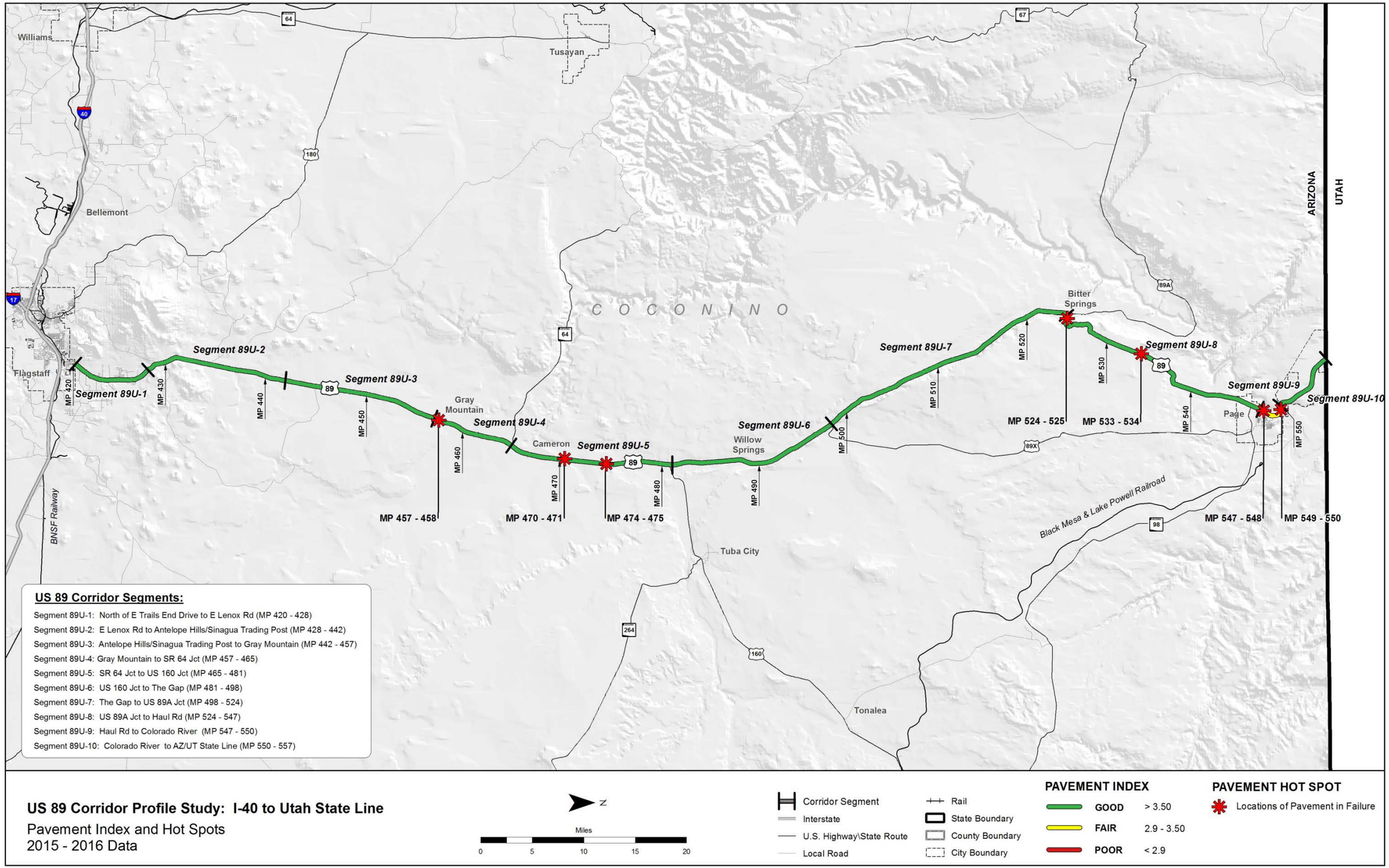
- Overall, based on the weighted average of the Pavement Index, the pavement is in “good” condition
- According to the Pavement Index, all of the Pavement is in “good” condition except Segment 89U-9, which has “fair” performance
- There are several failure hot spots along the corridor in segments 89U-4, 5, 8, and 9.
- 67% of the pavement in segment 89U-9 is considered to be in failure.
- The Directional PSR performance is “good”, with the exception of “fair” performance in segments 89U-3, 4, and 5.
- Segment 89U-9 in Page has the lowest Index Score, highest % Area Failure, and both Directional PSR values are “fair”.

Table 5 summarizes the Pavement performance results for the US 89 Corridor. **Figure 8** illustrates the primary Pavement Index performance and locations of Pavement hot spots along the US 89 Corridor. Maps for each secondary measure can be found in **Appendix A**.

Table 5: Pavement Performance

Segment	Segment Length (miles)	Pavement Index	Directional PSR		% Area Failure
			NB	SB	
89U-1	8	4.29	4.19	3.04	0.0%
89U-2	14	4.02	3.70	4.04	0.0%
89U-3	15	3.73	3.47	3.28	0.0%
89U-4	8	3.64	3.45	3.45	12.5%
89U-5	16	3.66	3.35	3.35	12.5%
89U-6	17	4.04	3.73	3.73	0.0%
89U-7	26	4.01	3.85	3.85	0.0%
89U-8	23	3.72	3.71	3.71	8.7%
89U-9	3	2.98	3.19	3.19	66.7%
89U-10	7	3.82	3.86	3.86	0.0%
Weighted Corridor Average		3.86	3.68	3.63	5.1%
SCALES					
Performance Level		**Non-Interstate**			
Good		> 3.50	> 3.50		< 5%
Fair		2.90-3.50	2.90-3.50		5% - 20%
Poor/ Below Average Performance		< 2.90	< 2.90		> 20%

Figure 8: Pavement Performance

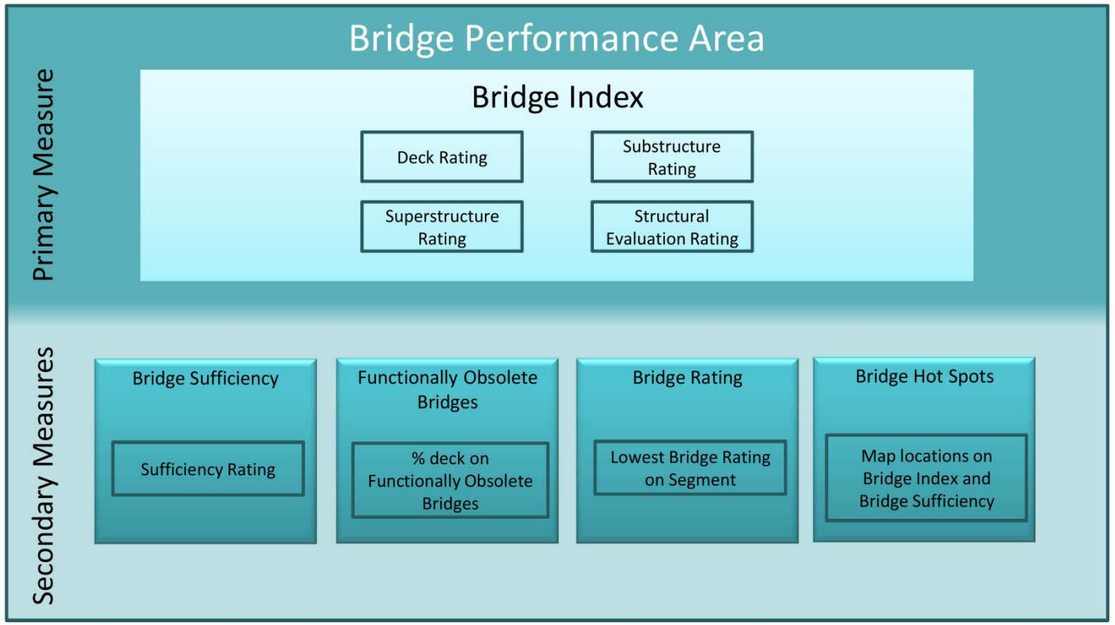


2.3 Bridge Performance Area

The Bridge Performance Area consists of a primary measure (Bridge Index) and four secondary measures, as shown in **Figure 9**. These measures assess the condition of the existing bridges along the US 89 Corridor.

Only bridges that carry mainline traffic or bridges that cross the mainline are included in the calculation. The detailed calculations and equations developed for each measure are available in **Appendix B** and the performance data for this corridor is contained in **Appendix C.**

Figure 9: Bridge Performance Measures



Primary Bridge Index

The Bridge Index is calculated based on the use of four different bridge condition ratings from the ADOT Bridge Database, also known as the Arizona Bridge Information and Storage System (ABISS). The four ratings are the Deck Rating, Substructure Rating, Superstructure Rating, and Structural Evaluation Rating. These ratings are based on inspection reports and establish the structural adequacy of each bridge. The performance of each individual bridge is established by using the lowest of these four ratings. The use of these ratings, and the use of the lowest rating, is consistent with the approach used by the ADOT Bridge Group to assess the need for bridge rehabilitation. The Bridge Index is calculated as a weighted average for each segment based on deck area.

Secondary Bridge Measures

Four secondary measures provide an in-depth evaluation of the characteristics of each bridge:

Bridge Sufficiency

- Multipart rating includes structural adequacy and safety factors as well as functional aspects such as traffic volume and length of detour
- Rates the structural and functional sufficiency of each bridge on a 100-point scale

Functionally Obsolete Bridges

- Percentage of total deck area in a segment that is on functionally obsolete bridges
- Identifies bridges that no longer meet standards for current traffic volumes, lane width, shoulder width, or bridge rails
- A bridge that is functionally obsolete may still be structurally sound

Bridge Rating

- The lowest rating of the four bridge condition ratings (substructure, superstructure, deck, and structural evaluation) on each segment
- Identifies lowest performing evaluation factor on each bridge

Bridge Hot Spots

- A Bridge “hot spot” is identified where a given bridge has a bridge rating of 4 or lower or multiple ratings of 5 between the deck, superstructure, and substructure ratings
- Identifies particularly low-performing bridges or those that may decline to low performance in the immediate future

Bridge Performance Results

The Bridge Index provides a high-level assessment of the structural condition of bridges for the corridor and for each segment. The four secondary measures provide more detailed information to assess bridge performance.

Based on the results of this analysis, the following observations were made:

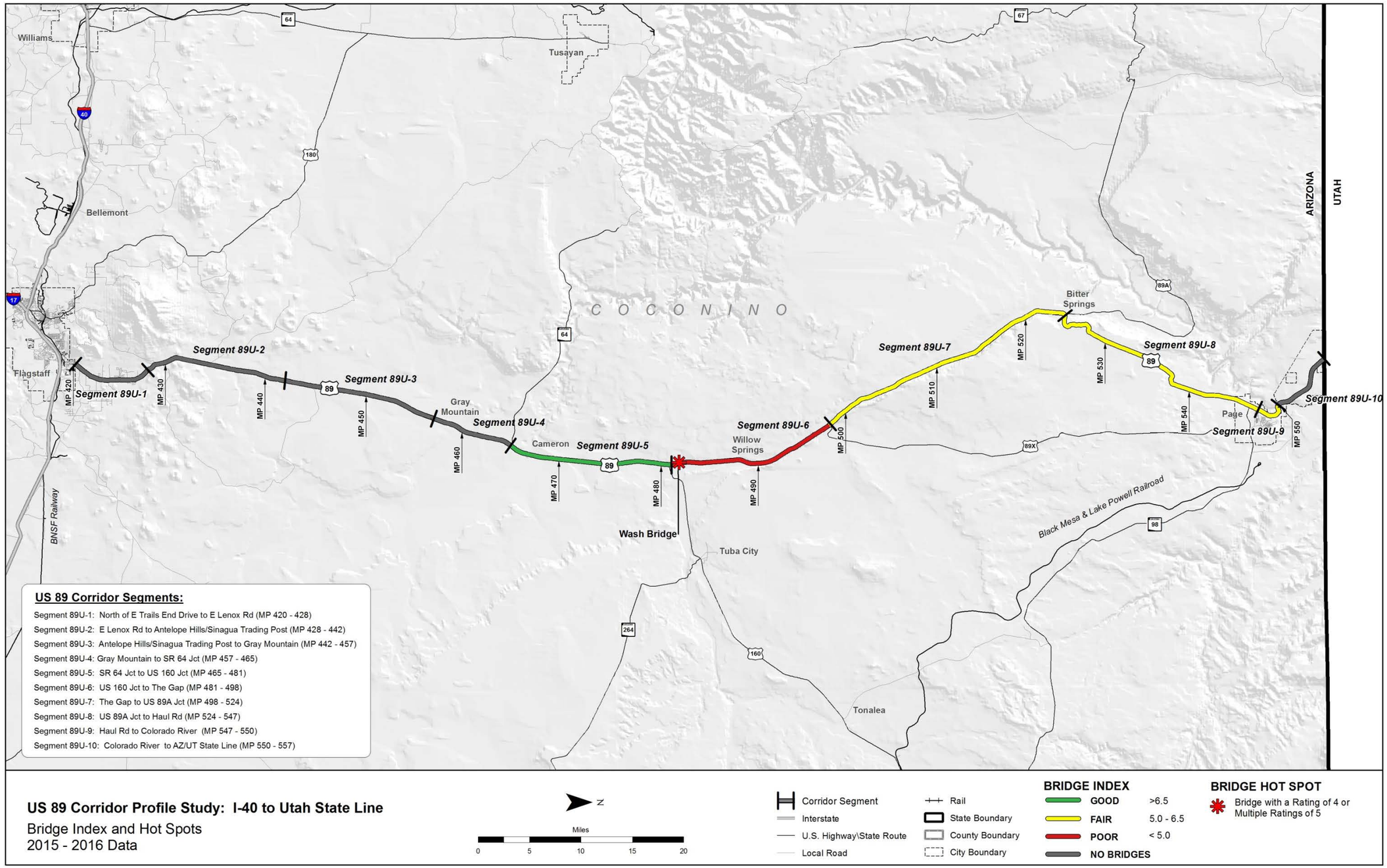
- Overall, based on the weighted average of the Bridge Index the corridor is performing in a “fair” manner. Of the segments that contain bridges, three are performing fairly, while one is in “good” condition and one is in “poor” condition.
- There is one bridge designated as structurally deficient along the corridor.
- There is one bridge with a sufficiency rating of “poor” in the corridor.
- Only 1 bridge rates as functionally obsolete throughout the entire corridor.
- There are no bridges located in segments 89U-1 through 89U-4 and 89U-10.
- There is one bridge hot spot located in segment 89U-6.

Table 6 summarizes the Bridge performance results for the US 89 Corridor. **Figure 10** illustrates the primary Bridge Index performance along the US 89 Corridor. Maps for each secondary measure can be found in **Appendix A.**

Table 6: Bridge Performance

Segment	Segment Length (miles)	# of Bridges	Bridge Index	Bridge Sufficiency	Lowest Bridge Rating	% of Deck Area on Functionally Obsolete Bridges
89U-1	8	0	No Bridges in Segment			
89U-2	14	0	No Bridges in Segment			
89U-3	15	0	No Bridges in Segment			
89U-4	8	0	No Bridges in Segment			
89U-5	16	0	6.80	86.40	5	8.5%
89U-6	17	6	4.46	58.03	4	0.0%
89U-7	26	2	6.00	77.10	6	0.0%
89U-8	23	1	6.00	73.10	6	0.0%
89U-9	3	1	6.00	67.70	6	0.0%
89U-10	7	1	No Bridges in Segment			
Weighted Corridor Average			6.15	77.49	5.40	5%
SCALES						
Performance Level			**ALL**			
Good			> 6.5	> 80	> 6	< 12%
Fair			5.0 – 6.5	50 - 80	5 – 6	12% - 40%
Poor			< 5.0	< 50	< 5	> 40 %

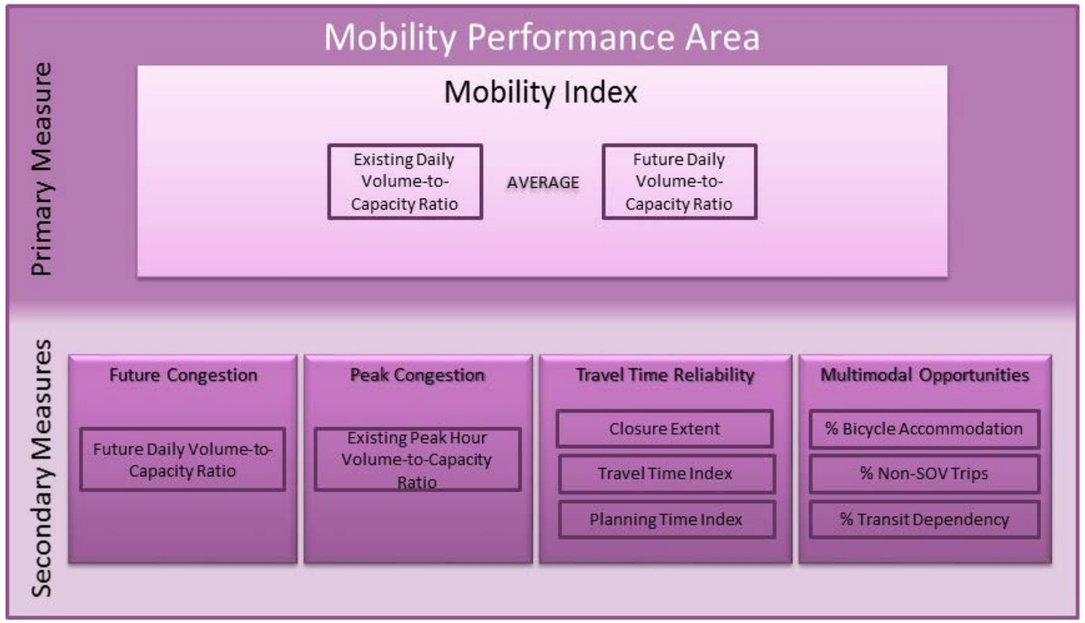
Figure 10: Bridge Performance



2.4 Mobility Performance Area

The Mobility performance area consists of a primary measure (Mobility Index) and four secondary measures, as shown in **Figure 11**. These measures assess the condition of existing mobility along the US 89 Corridor. The detailed calculations and equations developed for each measure are available in **Appendix B** and the performance data for this corridor is contained in **Appendix C.**

Figure 11: Mobility Performance Measures



Primary Mobility Index

The Mobility Index is an average of the existing (2015) daily volume-to-capacity (V/C) ratio and the future (2035 AZTDM) daily V/C ratio for each segment of the corridor. The V/C ratio is an indicator of the level of congestion. This measure compares the average annual daily traffic (AADT) volume to the capacity of the corridor segment as defined by the service volume for level of service (LOS) E. By using the average of the existing and future year daily volumes, this index measures the level of daily congestion projected to occur in approximately ten years (2025) if no capacity improvements are made to the corridor.

Each corridor segment is rated on a scale with other segments in similar operating environments. Within the Mobility performance area, the relevant operating environments are urban vs. rural setting and interrupted flow (e.g., signalized at-grade intersections are present) vs. uninterrupted flow (e.g., controlled access grade-separated conditions such as a freeway or interstate highway). For the US 89 Corridor, the following operating environments were identified:

- Rural Uninterrupted Flow
- Rural Interrupted Flow

Secondary Mobility Measures

Four secondary measures provide an in-depth evaluation of operational characteristics of the corridor:

Future Congestion – Future Daily V/C

- The future (2035 AZTDM) daily V/C ratio. This measure is the same value used in the calculation of the Mobility Index
- Provides a measure of future congestion if no capacity improvements are made to the corridor

Peak Congestion – Existing Peak Hour V/C

- The peak hour V/C ratio for each direction of travel
- Provides a measure of existing peak hour congestion during typical weekdays

Travel Time Reliability– Three separate travel time reliability indicators together provide a comprehensive picture of how much time may be required to travel within the corridor:

- Closure Extent:
  - The average number of instances a particular milepost is closed per year per mile on a given segment of the corridor in a specific direction of travel; a weighted average was applied to each closure that takes into account the distance over which the closure occurs
  - Closures related to crashes, weather, or other incidents are a significant contributor to non-recurring delays; construction-related closures were excluded from the analysis
- Directional Travel Time Index (TTI):
  - The ratio of the average peak period travel time to the free-flow travel time (based on the posted speed limit) in a given direction
  - The TTI recognizes the delay potential from recurring congestion during peak periods; different thresholds are applied to uninterrupted flow (freeways) and interrupted flow (non-freeways) to account for flow characteristics
- Directional Planning Time Index (PTI):
  - The ratio of the 95th percentile travel time to the free-flow travel time (based on the posted speed limit) in a given direction
  - The PTI recognizes the delay potential from non-recurring delays such as traffic crashes, weather, or other incidents; different thresholds are applied to uninterrupted flow (freeways) and interrupted flow (non-freeways) to account for flow characteristics
  - The PTI indicates the amount of time in addition to the typical travel time that should be allocated to make an on-time trip 95% of the time in a given direction

Multimodal Opportunities – Three multimodal opportunity indicators reflect the characteristics of the corridor that promote alternate modes to the single occupancy vehicle (SOV) for trips along the corridor:

- % Bicycle Accommodation:
  - Percentage of the segment that accommodates bicycle travel; bicycle accommodation on the roadway or on shoulders varies depending on traffic volumes, speed limits, and surface type
  - Encouraging bicycle travel has the potential to reduce automobile travel, especially on non-interstate highways
- % Non-SOV Trips:
  - The percentage of trips (less than 50 miles in length) by non-SOVs
  - The percentage of non-SOV trips in a corridor gives an indication of travel patterns along a section of roadway that could benefit from additional multimodal options
- % Transit Dependency:
  - The percentage of households that have zero or one automobile and households where the total income level is below the federally defined poverty level
  - Used to track the level of need among those who are considered transit dependent and more likely to utilize transit if it is available

Mobility Performance Results

The Mobility Index provides a high-level assessment of mobility conditions for the corridor and for each segment. The four secondary measures provide more detailed information to assess mobility performance.

Based on the results of this analysis, the following observations were made:

- Overall, based on the weighted average of the Mobility Index, the performance of traffic operations is “good”
- The performance for existing peak hour traffic operations is “good” along the entire corridor
- The performance of future traffic operations is anticipated to be good in all segments along the corridor, however future demand is projected to exceed capacity in segment 89U-9.
- Closure Extent is rated overall good for the corridor, where the segments 89-U1,2, and 8 perform fair.
- The TTI measures generally show “good” performance along the corridor, except for three segments with “fair” performance: segments 89U-8, 85-9, and 85-10.
- Half of the segments in the PTI measures show “poor” performance
- A majority of the corridor shows “poor” or “fair” performance for non-SOV trips, meaning that many vehicles carry only a single occupant
- The corridor’s bicycle accommodation fluctuates throughout the entirety, where three segments show a rating of “poor”, three segments show a rating of “fair”, and four segments show a rating of “good”.

Table 7 summarizes the Mobility performance results for the US 89 Corridor. **Figure 12** illustrates the primary Mobility Index performance along the US 89 Corridor. Maps for each secondary measure can be found in **Appendix A**.

Table 7: Mobility Performance

Segment	Segment Length (miles)	Mobility Index	Future Daily V/C	Existing Peak Hour V/C		Closure Extent (occurrences /year/mile)		Directional TTI (all vehicles)		Directional PTI (all vehicles)		% Bicycle Accommodation	% Non-Single Occupancy Vehicle Trips
				NB	SB	NB	SB	NB	SB	NB	SB		
89U-1*[1]	8	0.52	0.63	0.36	0.38	0.53	0.11	1.12	1.11	2.23	2.29	19%	20.3%
89U-2^[2]	14	0.15	0.20	0.09	0.09	0.25	0.01	1.02	1.03	1.24	1.42	97%	18.1%
89U-3^[2]	15	0.26	0.32	0.21	0.21	0.00	0.04	1.00	1.01	1.14	1.25	89%	14.2%
89U-4^[2]	8	0.28	0.35	0.19	0.19	0.00	0.03	1.11	1.17	2.38	2.16	94%	6.3%
89U-5*[2]	16	0.37	0.46	0.24	0.24	0.13	0.05	1.10	1.13	1.74	2.07	75%	8.8%
89U-6^[2]	17	0.16	0.19	0.15	0.14	0.02	0.01	1.03	1.01	1.50	1.28	99%	11.1%
89U-7^[2]	26	0.11	0.15	0.06	0.06	0.03	0.02	1.01	1.05	1.53	1.60	88%	9.3%
89U-8^[2]	23	0.28	0.34	0.17	0.17	0.31	0.09	1.21	1.23	2.69	2.92	2%	11.1%
89U-9*[1]	3	0.85	1.05	0.54	0.56	0.07	0.07	1.30	1.38	2.86	3.16	91%	4.9%
89U-10^[2]	7	0.27	0.33	0.12	0.12	0.06	0.00	1.17	1.18	2.40	2.43	3%	4.9%
Weighted Corridor Average		0.25	0.32	0.17	0.17	0.14	0.04	1.08	1.10	1.84	1.93	66.5%	11.3%

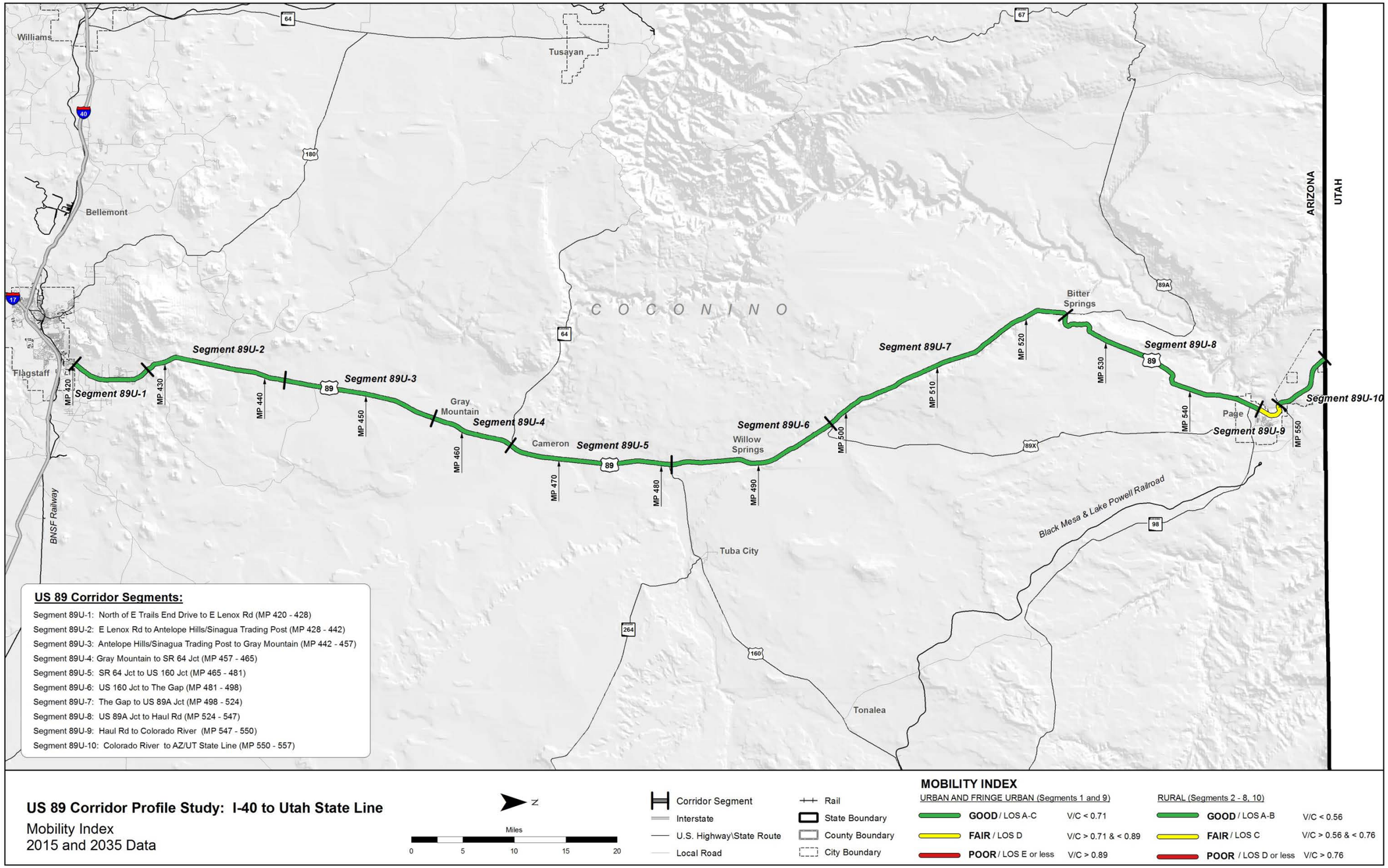
SCALES

Performance Level	Urban (Rural)	All	Uninterrupted Flow		All	
Good	< 0.71 (< 0.56)	< 0.22	< 1.15	< 1.30	> 90%	> 17%
Fair	0.71 – 0.89 (0.56 – 0.76)	0.22 – 0.62	1.15 – 1.33	1.30 – 1.50	60% - 90%	11% - 17%
Poor	> 0.89 (> 0.76)	> 0.62	> 1.33	> 1.50	< 60%	< 11%

Interrupted Flow	
<1.30	<3.00
1.30 - 2.00	3.00 - 6.00
>2.00	>6.00

^Uninterrupted Flow Facility
*Interrupted Flow Facility
[1]Urban Operating Environment
[2]Rural Operating Environment

Figure 12: Mobility Performance



2.5 Safety Performance Area

The Safety performance area consists of a primary measure (Safety Index) and four secondary measures, as illustrated in **Figure 13**. All measures relate to crashes that result in fatal and incapacitating injuries, as these types of crashes are the emphasis of the ADOT Strategic Highway Safety Plan (SHSP), FHWA, and MAP-21. The detailed calculations and equations developed for each measure are available in **Appendix B** and the performance data for this corridor is contained in **Appendix C.**

Figure 13: Safety Performance Measures

Primary Safety Index

The Safety Index is based on the bi-directional frequency and rate of fatal and incapacitating injury crashes, the relative cost of those types of crashes, and crash occurrences on similar roadways in Arizona. According to ADOT's 2010 Highway Safety Improvement Program Manual, fatal crashes have an estimated cost that is 14.5 times the estimated cost of incapacitating injury crashes ($5.8 million compared to $400,000).

Each corridor segment is rated on a scale by comparing the segment score with the average statewide score for similar operating environments. Because crash frequencies and rates vary depending on the operating environment of a particular roadway, statewide values were developed for similar operating environments defined by functional classification, urban vs. rural setting, number of travel lanes, and traffic volumes.

For the US 89 Corridor, the following operating environments were identified:

- 4 or 5 Lane Undivided Highway: Segment 89U-1
- 2 or 3 or 4 Lane Divided Highway: Segment 89U-2
- 2 or 3 Lane Undivided Highway: Segments 89U-3 through 89U-10

Secondary Safety Measures

Four secondary measures provide an in-depth evaluation of the different characteristics of safety performance:

Directional Safety Index

- This measure is based on the directional frequency and rate of fatal and incapacitating injury crashes

SHSP Emphasis Areas

ADOT's 2014 SHSP identified several emphasis areas for reducing fatal and incapacitating injury crashes. This measure compared rates of crashes in the top five SHSP emphasis areas to other corridors with a similar operating environment. The top five SHSP emphasis areas related to the following driver behaviors:

- Speeding and aggressive driving
- Impaired driving
- Lack of restraint usage
- Lack of motorcycle helmet usage
- Distracted driving

Crash Unit Types

- The percentage of total fatal and incapacitating injury crashes that involves crash unit types of motorcycles, trucks, or non-motorized travelers is compared to the statewide average on roads with similar operating environments

Safety Hot Spots

- The hot spot analysis identifies abnormally high concentrations of fatal and incapacitating injury crashes along the study corridor by direction of travel

For the Safety Index and the secondary safety measures, any segment that has too small of a sample size to generate statistically reliable performance ratings for a particular performance measure is considered to have "insufficient data" and is excluded from the safety performance evaluation for that particular performance measure.

Safety Performance Results

The Safety Index provides a high-level assessment of safety performance for the corridor and for each segment. The four secondary measures provide more detailed information to assess safety performance.

For the US 89 Corridor, it was determined that the crash unit type performance measures for crashes involving trucks, motorcycles, and non-motorized travelers have insufficient data (i.e., too small of a sample size) to generate reliable performance ratings. Therefore, these measures were not included in the performance evaluation for this corridor. Similarly, segments 89U 1, 3, 4, 6, 7, and 10 have insufficient data to generate reliable ratings for percentage of fatal and incapacitating crashes involving SHSP top 5 emphasis area behaviors.

Based on the results of this analysis, the following observations were made:

- A total of 53 fatal and incapacitating injury crashes occurred along the US 89 Corridor in 2011-2015; of these crashes, 13 were fatal and 40 involved incapacitating injuries
- Overall, based on the weighted average of the Safety Index, the corridor shows "above average" performance
- For the Safety Index, half of the corridor shows a rating of "above average", one segment shows "average" performance, and three segments are showing "below average" performance.
- Segments 89U-5 and 8 perform "below average" in the Safety Index, Top 5 SHSP Emphasis Areas, and both directions of travel for the Directional Safety Index.
- The US 89 corridor does not have any Safety hotspots.

Table 8 summarizes the Safety performance results for the US 89 Corridor. **Figure 14** illustrates the primary Safety Index performance and locations of safety hot spots along the US 89 Corridor. Maps for each secondary measure can be found in **Appendix A**.

Table 8: Safety Performance

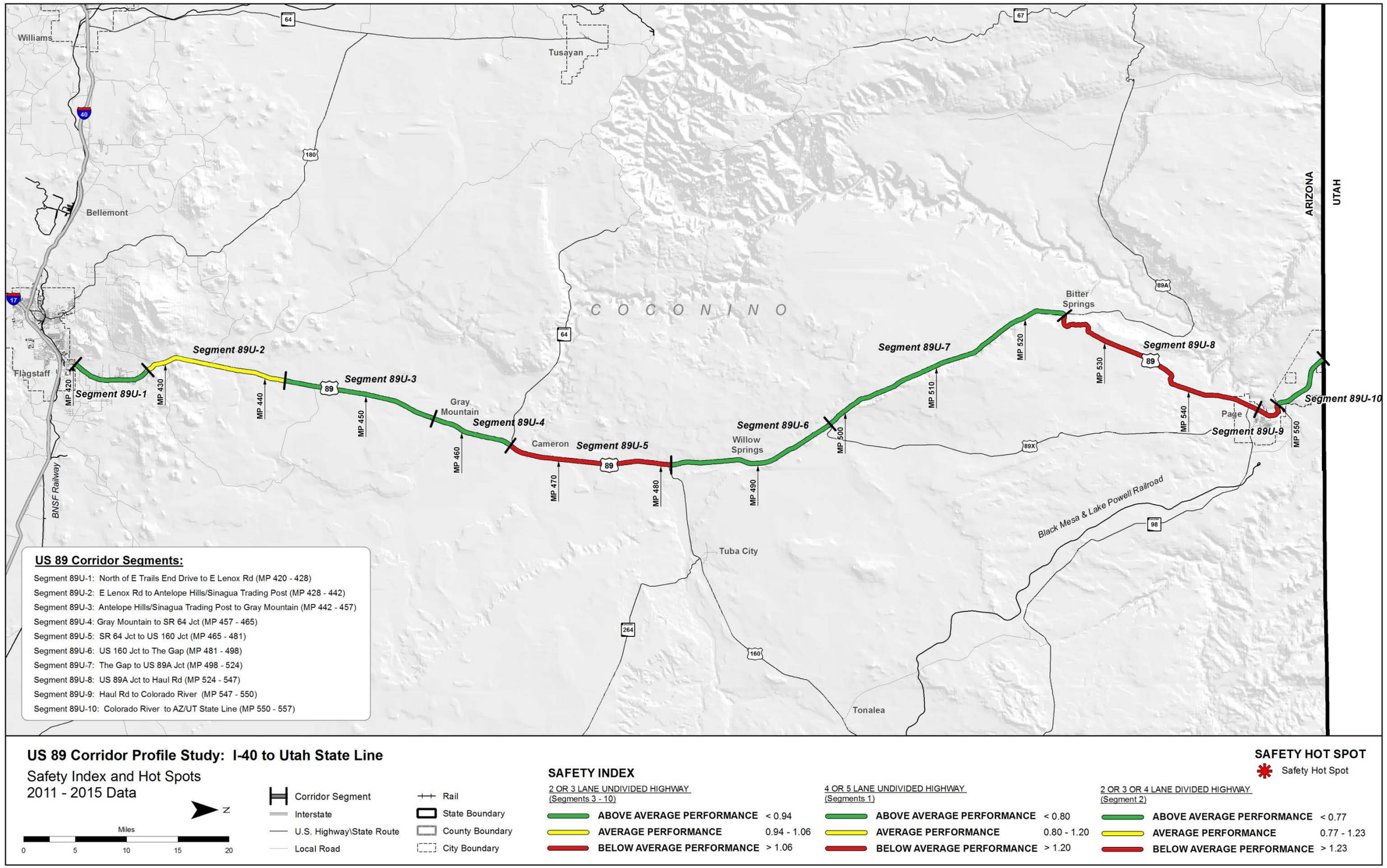
Segment	Segment Length (miles)	Total Fatal & Incapacitating Injury Crashes (F/I)	Safety Index	Directional Safety Index		% of Fatal + Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Areas Behaviors
				NB	SB	
89U-1[a]	8	1/5	0.40	0.76	0.04	17%
89U-2[b]	14	3/10	1.13	2.01	0.25	31%
89U-3[c]	15	0/2	0.05	0.10	0.00	Insufficient Data
89U-4[c]	8	1/2	0.77	1.53	0.00	Insufficient Data
89U-5[c]	16	4/4	1.43	1.48	1.38	Insufficient Data
89U-6[c]	17	1/3	0.48	0.11	0.86	Insufficient Data
89U-7[c]	26	0/2	0.04	0.08	0.00	Insufficient Data
89U-8[c]	23	2/5	1.19	1.29	1.09	71%
89U-9[c]	3	1/5	2.49	0.51	4.47	17%
89U-10[c]	7	0/2	0.12	0.12	0.12	Insufficient Data
Weighted Corridor Average			0.68	0.79	0.58	34%

SCALES		
Performance Level	**2 or 3 or 4 Lane Divided Highway**	
Above Average	< 0.77	< 44%
Average	0.77 – 1.23	44% - 54%
Below Average	> 1.23	> 54%
Performance Level	**4 or 5 Lane Undivided Highway**	
Above Average	< 0.80	< 42%
Average	0.80 – 1.20	42% - 51%
Below Average	> 1.20	> 51%
Performance Level	**2 or 3 Lane Undivided Highway**	
Above Average	< 0.94	< 51%
Average	0.94 – 1.06	51% - 58%
Below Average	> 1.06	> 58%

Note: "Insufficient Data" indicates there was not enough data available to generate reliable performance ratings.

[a]4 or 5 Lane Undivided Highway [b]2 or 3 or 4 Lane Divided Highway [c]2 or 3 Lane Undivided Highway

Figure 14: Safety Performance



2.6 Freight Performance Area

The Freight performance area consists of a single Freight Index and five secondary measures as illustrated in **Figure 15**. All measures relate to the reliability of truck travel as measured by observed truck travel time speed and delays to truck travel from freeway closures or physical restrictions to truck travel. The detailed calculations and equations developed for each measure are available in **Appendix B** and the performance data for this corridor is contained in **Appendix C.**

Figure 15: Freight Performance Measures

Primary Freight Index

The Freight Index is a reliability performance measure based on the PTI for truck travel. The Truck Planning Time Index (TPTI) is the ratio of the 95th percentile truck travel time to the free-flow truck travel time. The TPTI reflects the extra buffer time needed for on-time delivery while accounting for non-recurring delay. Non-recurring delay refers to unexpected or abnormal delay due to closures or restrictions resulting from circumstances such as crashes, inclement weather, and construction activities.

Each corridor segment is rated on a scale with other segments in similar operating environments. Within the Freight performance area, the relevant operating environments are interrupted flow (e.g., signalized at-grade intersections are present) and uninterrupted flow (e.g., controlled access grade-separated conditions such as a freeway or interstate highway).

For the, the following operating environments were identified:

- Segments 89U 2, 3, 4, 6, 7, and 8 are identified as Uninterrupted Flow
- Segments 89U 1, 5, 9, and 10 are identified as Interrupted Flow

Secondary Freight Measures

The Freight performance area includes five secondary measures that provide an in-depth evaluation of the different characteristics of freight performance:

Recurring Delay (Directional Truck Travel Time Index [TTTI])

- The ratio of the average peak period truck travel time to the free-flow truck travel time (based on the posted speed limit up to a maximum of 65 miles per hour) in a given direction
- The TTTI recognizes the delay potential from recurring congestion during peak periods; different thresholds are applied to uninterrupted flow (freeways) and interrupted flow (non-freeways) to account for flow characteristics

Non-Recurring Delay (Directional TPTI)

- The ratio of the 95th percentile truck travel time to the free-flow truck travel time (based on the posted speed limit up to a maximum of 65 miles per hour) in a given direction
- The TPTI recognizes the delay potential from non-recurring delays such as traffic crashes, weather, or other incidents; different thresholds are applied to uninterrupted flow (freeways) and interrupted flow (non-freeways) to account for flow characteristics
- The TPTI indicates the amount of time in addition to the typical travel time that should be allocated to make an on-time trip 95% of the time in a given direction

Closure Duration

- The average time (in minutes) a particular milepost is closed per year per mile on a given segment of the corridor in a specific direction of travel; a weighted average is applied to each closure that takes into account the distance over which the closure occurs

Bridge Vertical Clearance

- The minimum vertical clearance (in feet) over the travel lanes for underpass structures on each segment

Bridge Vertical Clearance Hot Spots

- A Bridge vertical clearance “hot spot” exists where the underpass vertical clearance over the mainline travel lanes is less than 16.25 feet and no exit/entrance ramps exist to allow vehicles to bypass the low clearance location
- If a location with a vertical clearance less than 16.25 feet can be avoided by using immediately adjacent exit/entrance ramps rather than the mainline, it is not considered a hot spot

Freight Performance Results

The Freight Index provides a high-level assessment of the freight mobility for the corridor and for each segment. The four secondary measures provide more detailed information to assess freight performance for each segment.

Each corridor segment is rated on a scale with other segments in similar operating environments. Within the freight performance area, the relevant operating environments included interrupted flow (signalized at-grade intersections are present) and uninterrupted flow (controlled access grade-separated conditions such as a freeway or interstate highway).

Based on the results of this analysis, the following observations could be made:

- Overall, based on the weighted average of the Freight Index, freight performs “average” throughout the US 89 corridor.
- Four of the segments show “good” performance in the Freight Index; four segments show “fair” performance, and two segments show “poor” performance.
- Segment 89U-8 was closed for nearly two years due a landslide.
- There are no underpasses along the US 89 corridor.

Table 9 summarizes the Freight performance for the US 89 Corridor. **Figure 16** illustrates the primary freight index performance and locations of freight hot spots along US 89. Maps for each secondary measure can be found in **Appendix A.**

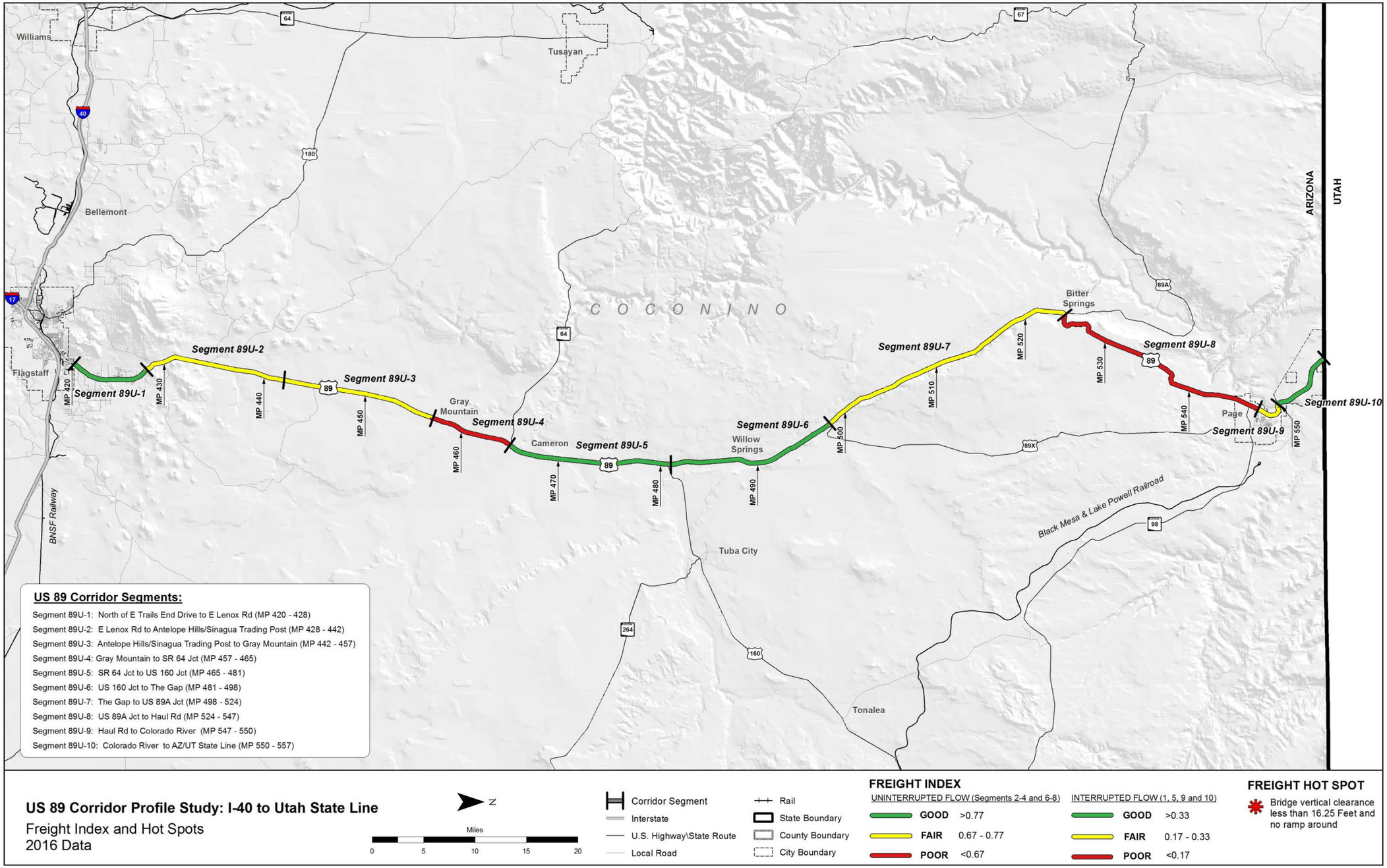
Table 9: Freight Performance

Segment	Segment Length (miles)	Freigh t Index	Directional TTTI		Directional TPTI		Closure Duration (minutes/milepost closed/year/mile)		Bridge Vertical Clearance (feet)
			NB	SB	NB	SB	NB	SB	
89U-1*[1]	8	0.42	1.19	1.16	2.66	2.11	2,620.49	18.18	No UP
89U-2^[2]	14	0.68	1.10	1.16	1.38	1.58	1,466.09	1.09	No UP
89U-3^[2]	15	0.76	1.05	1.11	1.22	1.40	0.00	6.57	No UP
89U-4^[2]	8	0.38	1.22	1.32	2.70	2.54	0.00	2.95	No UP
89U-5*[2]	16	0.55	1.14	1.20	1.65	1.99	17.75	7.90	No UP
89U-6^[2]	17	0.77	1.07	1.06	1.29	1.30	7.13	2.54	No UP
89U-7^[2]	26	0.70	1.05	1.07	1.43	1.41	8.37	1.47	No UP
89U-8^[2]	23	0.41	1.27	1.31	2.63	2.27	175,175.61	16.97	No UP
89U-9*[1]	3	0.28	1.40	1.43	3.19	4.09	11.53	192.53	No UP
89U-10*[2]	7	0.48	1.21	1.19	2.01	2.14	10.74	0.00	No UP
Weighted Corridor Average		0.59	1.14	1.17	1.83	1.83	29,717.2	10.6	No UP

SCALES					
Performance Level	**Uninterrupted Interrupted**			**All**	
Good	> 0.77^ > 0.33*	< 1.15^ < 1.30*	< 1.30^ < 3.00*	< 44.18	> 16.5
Fair	0.67 - 0.77^ 0.17 - 0.33*	1.15 -1.33^ 1.30 - 2.00*	1.30 - 1.50^ 3.00-6.00*	44.18 -124.86	16.0 - 16.5
Poor	< 0.67^ < 0.17*	> 1.33^ > 2.00*	> 1.50^ > 6.00*	> 124.86	< 16.0

[1]Urban Operating Environment [2]Rural Operating Environment ^Uninterrupted Flow Facility *Interrupted Flow Facility

Figure 16: Freight Performance



2.7 Corridor Performance Summary

Based on the results presented in the preceding sections, the following general observations were made related to the performance of the US 89 Corridor:

- The pavement performance is generally in “good” except at a few isolated locations.
- The bridge performance is generally in “fair” condition overall, however there are very few bridges along the corridor.
- The general mobility indices along the corridor have “good” performance where most are also showing very little recurring and non-recurring delays along the corridor. The bicycle accommodation, however, is in “poor” condition.
- The closures along the corridor are generally lower than the statewide average for both the closure frequency and duration, however there are a few outliers for duration, primarily due to the extended closure of segment 8.
- Overall, based on the weighted average of the Safety Index, the corridor performs “above average”. The % of SHSP related crashes shows “poor” performance.

Figure 17 shows the percentage of the US 89 Corridor that rates either “good/above average performance”, “fair/average performance”, or “poor/below average” performance for each primary measure. Approximately 98% of the corridor shows “good” performance in the Pavement Index. For the Bridge Index, 55% of the corridor shows “good” performance, and 27% shows “fair” performance. Approximately 98% of the corridor shows “good” performance in Mobility, while the remaining 2% shows “poor” performance. The majority of the corridor (59%) for the Safety index shows “above average” performance, while 10% of the corridor shows “average” performance, and 31% of the corridor shows “poor” performance. For the Freight Index, approximately 78% of the corridor shows “good” performance while 22% shows “poor” performance.

The lowest performance along the US 89 Corridor generally occurs in the Safety performance areas while the Pavement and Mobility performance areas showing the highest performance.

Table 10 shows a summary of corridor performance for all primary measures and secondary measure indicators for the US 89 Corridor. A weighted corridor average rating (based on the length of the segment) was calculated for each primary and secondary measure. The weighted average ratings are summarized in **Figure 18** which also provides a brief description of each performance measure. **Figure 18** represents the average for the entire corridor and any given segment or location could have a higher or lower rating than the corridor average.

Figure 17: Performance Summary by Primary Measure

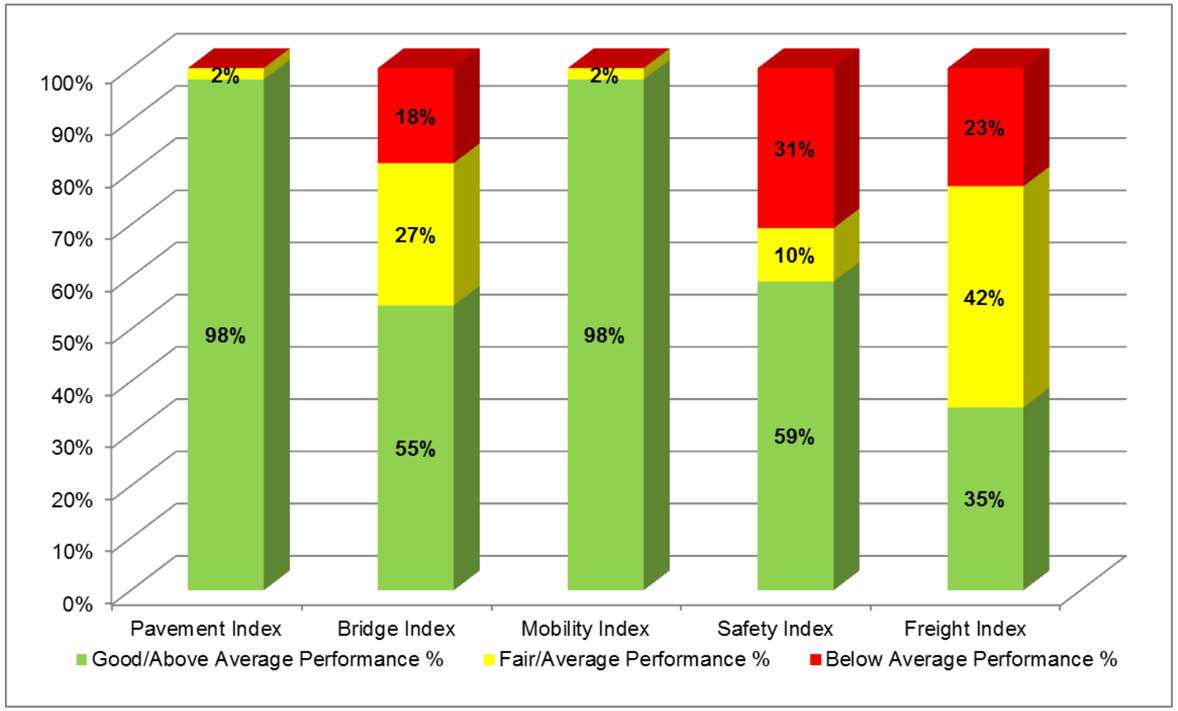


Figure 18: Corridor Performance Summary by Performance Measure

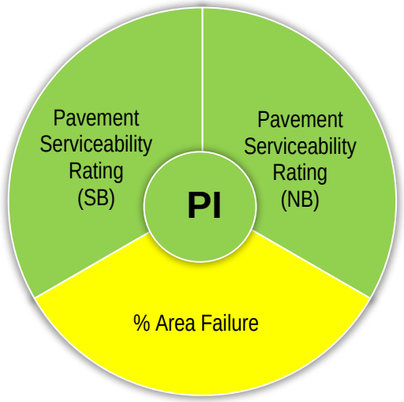
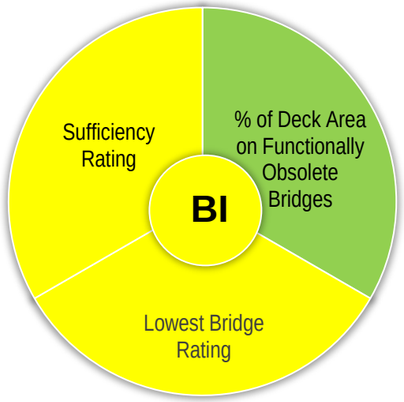
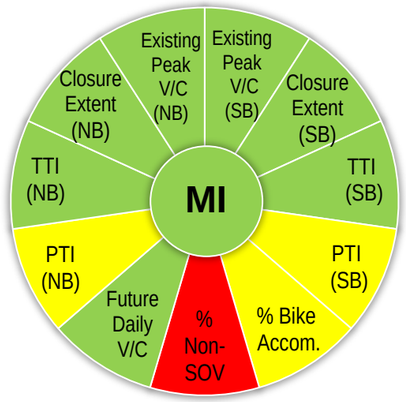
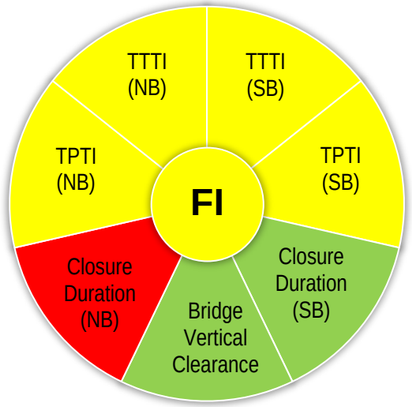
Pavement	Bridge	Mobility	Safety	Freight
				
Pavement Index (PI): based on two pavement condition ratings from the ADOT Pavement Database; the two ratings are the International Roughness Index (IRI) and the Cracking Rating.	**Bridge Index (BI):** based on four bridge condition ratings from the ADOT Bridge Database; the four ratings are the Deck Rating, Substructure Rating, Superstructure Rating, and Structural Evaluation Rating	**Mobility Index (MI):** an average of the existing daily volume-to-capacity (V/C) ratio and the projected 2035 daily V/C ratio	**Safety Index (SI):** combines the bi-directional frequency and rate of fatal and incapacitating injury crashes, compared to crash occurrences on similar roadways in Arizona	**Freight Index (FI):** a reliability performance measure based on the bi-directional planning time index for truck travel
➢ Directional Pavement Serviceability Rating (PSR) – the weighted average (based on number of lanes) of the PSR for the pavement in each direction of travel ➢ % Area Failure – the percentage of pavement area rated above failure thresholds for IRI or Cracking	➢ Sufficiency Rating– multipart rating includes structural adequacy and safety factors as well as functional aspects such as traffic volume and length of detour ➢ % of Deck Area on Functionally Obsolete Bridges– the percentage of deck area in a segment that is on functionally obsolete bridges; identifies bridges that no longer meet standards for current traffic volumes, lane width, shoulder width, or bridge rails; a bridge that is functionally obsolete may still be structurally sound ➢ Lowest Bridge Rating –the lowest rating of the four bridge condition ratings on each segment	➢ Future Daily V/C – the future 2035 V/C ratio provides a measure of future congestion if no capacity improvements are made to the corridor ➢ Existing Peak Hour V/C – the existing peak hour V/C ratio for each direction of travel provides a measure of existing peak hour congestion during typical weekdays ➢ Closure Extent – the average number of instances a particular milepost is closed per year per mile on a given segment of the corridor in a specific direction of travel ➢ Directional Travel Time Index (TTI) – the ratio of the average peak period travel time to the free-flow travel time; the TTI represents recurring delay along the corridor ➢ Directional Planning Time Index (PTI) – the ratio of the 95th percentile travel time to the free-flow travel time; the PTI represents non-recurring delay along the corridor ➢ % Bicycle Accommodation – the percentage of a segment that accommodates bicycle travel ➢ % Non-single Occupancy Vehicle (Non-SOV) Trips –the percentage of trips that are taken by vehicles carrying more than one occupant	➢ Directional Safety Index – the combination of the directional frequency and rate of fatal and incapacitating injury crashes, compared to crash occurrences on similar roadways in Arizona ➢ % of Fatal + Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Areas Behaviors – the percentage of fatal and incapacitating crashes that involve at least one of the five Strategic Highway Safety Plan (SHSP) emphasis areas on a given segment compared to the statewide average percentage on roads with similar operating environments ➢ % of Fatal + Incapacitating Crashes Involving SHSP Crash Unit Types – the percentage of total fatal and incapacitating injury crashes that involves a given crash unit type (motorcycle, truck, non-motorized traveler) compared to the statewide average percentage on roads with similar operating environments	➢ Directional Truck Travel Time Index (TTTI) – the ratio of the average peak period truck travel time to the free-flow truck travel time; the TTTI represents recurring delay along the corridor ➢ Directional Truck Planning Time Index (TPTI) – the ratio the 95th percentile truck travel time to the free-flow truck travel time; the TPTI represents non-recurring delay along the corridor ➢ Closure Duration – the average time a particular milepost is closed per year per mile on a given segment of the corridor in a specific direction of travel ➢ Bridge Vertical Clearance – the minimum vertical clearance over the travel lanes for underpass structures on each segment

Table 10: Corridor Performance Summary by Segment and Performance Measure

Segment	Length (miles)	Pavement Performance Area				Bridge Performance Area				Mobility Performance Area											
		Pavement Index	Directional PSR		Pavement Failure	Bridge Index	Bridge Sufficiency	Bridge Rating	% Deck Area Functionally Obsolete	Mobility Index	Future Daily V/C	Existing Peak Hour V/C		Closure Extent (instances/milepost /year/mile)		Directional TTI (all vehicles)		Directional PTI (all vehicles)		% Bicycle Acc.	% Non-Single Occupancy Vehicle (SOV) Opportunities
			NB	SB								NB	SB	NB	SB	NB	SB	NB	SB		
89U-1*[1]	8	4.29	4.19	3.04	0.0%	No Bridges in Segment				0.52	0.63	0.36	0.38	0.53	0.10	1.12	1.11	2.23	2.29	19%	20.3%
89U-2^[2]	14	4.02	3.70	4.04	0.0%	No Bridges in Segment				0.15	0.20	0.09	0.09	0.25	0.01	1.02	1.03	1.24	1.42	97%	18.1%
89U-3^[2]	15	3.73	3.47	3.28	0.0%	No Bridges in Segment				0.26	0.32	0.21	0.21	0.00	0.04	1.00	1.01	1.14	1.25	89%	14.2%
89U-4^[2]	8	3.64	3.45	3.45	12.5%	No Bridges in Segment				0.28	0.35	0.19	0.19	0.00	0.03	1.11	1.17	2.38	2.16	94%	6.3%
89U-5*[2]	16	3.66	3.35	3.35	12.5%	6.80	86.40	5.00	8.5%	0.37	0.46	0.24	0.24	0.13	0.05	1.10	1.13	1.74	2.07	75%	8.8%
89U-6^[2]	17	4.04	3.73	3.73	0.0%	4.46	58.03	4.00	0.0%	0.16	0.19	0.15	0.14	0.02	0.01	1.03	1.01	1.50	1.28	99%	11.1%
89U-7^[2]	26	4.01	3.85	3.85	0.0%	6.00	77.10	6.00	0.0%	0.11	0.15	0.06	0.06	0.03	0.02	1.01	1.05	1.53	1.60	88%	9.3%
89U-8^[2]	23	3.72	3.71	3.71	8.7%	6.00	73.10	6.00	0.0%	0.28	0.34	0.17	0.17	0.31	0.09	1.21	1.23	2.69	2.92	2%	11.1%
89U-9*[1]	3	2.98	3.19	3.19	66.7%	6.00	67.70	6.00	0.0%	0.85	1.05	0.54	0.56	0.07	0.07	1.30	1.38	2.86	3.16	91%	4.9%
89U-10^[2]	7	3.82	3.86	3.86	0.0%	No Bridges in Segment				0.27	0.33	0.12	0.12	0.06	0.00	1.17	1.18	2.40	2.43	3%	4.9%
Weighted Corridor Average		3.86	3.68	3.63	5.1%	6.15	77.49	5.40	5%	0.25	0.32	0.17	0.17	0.14	0.04	1.08	1.10	1.84	1.93	66.5%	11.3%
SCALES																					
Performance Level		Non-Interstate								Urban (Rural)						Uninterrupted (Interrupted)				**All**	
Good/Above Average		> 3.50		< 5%		> 6.5	> 80	> 6	< 12%	< 0.71 (< 0.56)				< 0.22		< 1.15 (1.30)		<1.30 (3.00)		> 90%	> 17%
Fair/Average		2.90 - 3.50		5% - 20%		5.0 - 6.5	50 - 80	5 – 6	12% - 40%	0.71 - 0.89 (0.56 - 0.76)				0.22 – 0.62		1.15-1.33 (1.30-2.00)		1.30-1.50 (3.00-6.00)		60% - 90%	11% - 17%
Poor/Below Average		< 2.90		> 20%		< 5.0	< 50	< 5	> 40 %	> 0.89(> 0.76)				> 0.62		> 1.33 (2.00)		>1.50 (6.00)		< 60%	< 11%

^Uninterrupted Flow Facility
*Interrupted Flow Facility

[1]Urban Operating Environment
[2]Rural Operating Environment

Table 10: Corridor Performance Summary by Segment and Performance Measure (continued)

Segment	Length (miles)	Safety Performance Area				Freight Performance Area							
		Safety Index	Directional Safety Index		% of Fatal + Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Areas Behaviors	Freight Index	Directional TTI (trucks only)		Directional PTI (trucks only)		Closure Duration (mins/milepost closed/year/mile)		Bridge Vertical Clearance (feet)
			NB	SB			NB	SB	NB	SB	NB	SB	
89U-1*[a]	8	0.40	0.76	0.04	17%	0.42	1.19	1.16	2.66	2.11	2,620.5	18.2	No UP
89U-2^[b]	14	1.13	2.01	0.25	31%	0.68	1.10	1.16	1.38	1.58	1,466.1	1.1	No UP
89U-3^[c]	15	0.05	0.10	0.00	Insufficient Data	0.76	1.05	1.11	1.22	1.40	0.0	6.6	No UP
89U-4^[c]	8	0.77	1.53	0.00	Insufficient Data	0.38	1.22	1.32	2.70	2.54	0.0	3.0	No UP
89U-5*[c]	16	1.43	1.48	1.38	Insufficient Data	0.55	1.14	1.20	1.65	1.99	17.7	7.9	No UP
89U-6^[c]	17	0.48	0.11	0.86	Insufficient Data	0.77	1.07	1.06	1.29	1.30	7.1	2.5	No UP
89U-7^[c]	26	0.04	0.08	0.00	Insufficient Data	0.70	1.05	1.07	1.43	1.41	8.4	1.5	No UP
89U-8^[c]	23	1.19	1.29	1.09	71%	0.41	1.27	1.31	2.63	2.27	175,175.6	17.0	No UP
89U-9*[c]	3	2.49	0.51	4.47	17%	0.28	1.40	1.43	3.19	4.09	11.5	192.5	No UP
89U-10*[c]	7	0.12	0.12	0.12	Insufficient Data	0.48	1.21	1.19	2.01	2.14	10.7	0.0	No UP
Weighted Corridor Averages		0.68	0.79	0.58	34%	0.59	1.14	1.17	1.83	1.83	29,717.2	10.6	No UP

SCALES							
Performance Level	**2 or 3 or 4 Lane Divided, 4 or 5 Undivided, 2 or 3 Lane Undivided**		**Uninterrupted (Interrupted)**			**All**	
Good/Above Average	a < 0.77 b < 0.80 c < 0.94	a < 44% b < 42% c < 51%	> 0.77(0.33)	<1.15(1.30)	<1.30(3.00)	< 44.18	> 16.5
Fair/Average	a 0.77 – 1.23 b 0.80 – 1.20 c 0.94 – 1.06	a 44% - 54% b 42% - 51% e 51% - 58%	0.67 - 0.77 (0.17-0.33)	1.15-1.33(1.30-2.00)	1.30-1.50(3.00-6.00)	44.18 -124.86	16.0-16.5
Poor/Below Average	a > 1.23 b > 1.20 c > 1.06	a > 54% b > 51% c > 58%	< 0.67(0.17)	>1.33(2.00)	>1.50(6.00)	> 124.86	< 16.0

^Uninterrupted Flow Facility [a]4 or 5 Lane Undivided Highway [c] 2 or 3 Lane Undivided Highway
*Interrupted Flow Facility [b]2 or 3 or 4 Lane Divided Highway

3.0 NEEDS ASSESSMENT

3.1 Corridor Objectives

Statewide goals and performance measures were established by the ADOT Long-Range Transportation Plan (LRTP), 2010-2035. Statewide performance goals that are relevant to US 89 performance areas were identified and corridor goals were then formulated for each of the five performance areas that aligned with the overall statewide goals established by the LRTP. Based on stakeholder input, corridor goals, corridor objectives, and performance results, three "Emphasis Areas" were identified for the US 89 Corridor: Mobility, Safety, and Freight.

Taking into account the corridor goals and identified emphasis areas, performance objectives were developed for each quantifiable performance measure that identify the desired level of performance based on the performance scale levels for the overall corridor and for each segment of the corridor. For the performance emphasis areas, the corridor-wide weighted average performance objectives are identified with a higher standard than for the other performance areas. **Table 11** shows the US 89 Corridor goals, corridor objectives, and performance objectives, and how they align with the statewide goals.

It is not reasonable within a financially constrained environment to expect that every performance measure will always be at the highest levels on every corridor segment. Therefore, individual corridor segment objectives have been set as fair or better and should not fall below that standard. Achieving corridor and segment performance objectives will help ensure that investments are targeted toward improvements that support the safe and efficient movement of travelers on the corridor. Addressing current and future congestion, thereby improving mobility on congested segments, will also help the corridor fulfill its potential as a significant contributor to the region's economy.

Corridor performance is measured against corridor and segment objectives to determine needs – the gap between observed performance and performance objectives.

Goal achievement will improve or reduce current and future congestion, increase travel time reliability, and reduce fatalities and incapacitating injuries resulting from vehicle crashes. Where performance is currently rated "good", the goal is always to maintain that standard, regardless of whether or not the performance is in an emphasis area.

Table 11: Corridor Performance Goals and Objectives

ADOT Statewide LRTP Goals	US 89 Corridor Goals	US 89 Corridor Objectives	Performance Area	Primary Measure / Secondary Measure Indicators	Performance Objective: Corridor Average	Performance Objective: Segment
Improve Mobility, Reliability, and Accessibility **Make Cost Effective Investment Decisions and Support Economic Vitality**	Provide efficient commuting route within the Flagstaff metropolitan area, and to/from the Doney Park area, and to/from Tuba City. Provide efficient commuting route within the Page metropolitan area Provide reliable route for recreation and tourist travel to/from Northern Arizona Provide safe, reliable and efficient connection to all communities along the corridor to permit efficient regional and local travel	Reduce current congestion and plan to facilitate future congestion that accounts for anticipated growth and land use changes Reduce delays from recurring and non-recurring events to improve reliability Improve bicycle and pedestrian accommodations	Mobility *(Emphasis Area)*	Mobility Index	Good	Fair or better
				Future Daily V/C		
				Existing Peak Hour V/C		
				Closure Extent		
				Directional Travel Time Index		
				Directional Planning Time Index		
				% Bicycle Accommodation		
				% Non-SOV Trips		
	Provide a safe, reliable and efficient freight route between Arizona, Utah, and Colorado	Reduce delays and restrictions to freight movement to improve reliability Improve travel time reliability (including impacts to motorists due to freight traffic)	Freight	Freight Index	Fair or better	Fair or better
				Directional Truck Travel Time Index		
				Directional Truck Planning Time Index		
				Closure Duration		
				Bridge Vertical Clearance		
Preserve and Maintain the System	Preserve and modernize highway infrastructure	Meet or exceed the percent of State Highway System and off-system bridges conditions in a state of good repair.	Bridge	Bridge Index	Fair or better	Fair or better
				Sufficiency Rating		
				% of Deck Area on Functionally Obsolete Bridges		
				Lowest Bridge Rating		
		Meet or exceed the percent of State Highway System pavement conditions in a state of good repair.	Pavement *(Emphasis Area)*	Pavement Index	Good	Fair or better
				Directional Pavement Serviceability Rating		
				% Area Failure		
Enhance Safety	Provide a safe, reliable, and efficient corridor Promote safety by implementing appropriate countermeasures	Reduce the number and rate of highway fatalities. Reduce the number and rate of serious injuries. Reduce the number of non-motorized fatalities. Reduce the number of non-motorized serious injuries	Safety *(Emphasis Area)*	Safety Index	Above Average	Average or better
				Directional Safety Index		
				% of Crashes Involving SHSP Top 5 Emphasis Areas Behaviors		
				% of Crashes Involving Crash Unit Types		

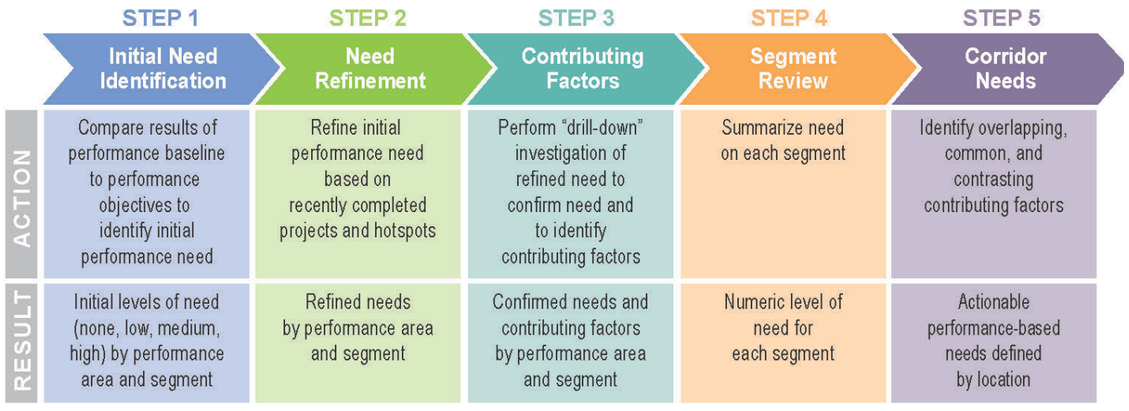
3.2 Needs Assessment Process

The following guiding principles were used as an initial step in developing a framework for the performance-based needs assessment process:

- Corridor needs are defined as the difference between the corridor performance and the performance objectives
- The needs assessment process should be systematic, progressive, and repeatable, but also allow for engineering judgment where needed
- The process should consider all primary and secondary performance measures developed for the study
- The process should develop multiple need levels including programmatic needs for the entire length of the corridor, performance area-specific needs, segment-specific needs, and location-specific needs (defined by MP limits)
- The process should produce actionable needs that can be addressed through strategic investments in corridor preservation, modernization, and expansion

The performance-based needs assessment process is illustrated in **Figure 19** and described in the following sections.

Figure 19: Needs Assessment Process



Step 1: Initial Needs Identification

The first step in the needs assessment process links baseline (existing) corridor performance with performance objectives. In this step, the baseline corridor performance is compared to the performance objectives to provide a starting point for the identification of performance needs. This mathematical comparison results in an initial need rating of None, Low, Medium, or High for each primary and secondary performance measure. An illustrative example of this process is shown below in **Figure 20**.

Figure 20: Initial Need Ratings in Relation to Baseline Performance (Bridge Example)

Performance Thresholds	Performance Level	Initial Level of Need	Description
6.5	Good	None	All levels of Good and top 1/3 of Fair (>6.0)
	Good		
	Good		
	Fair		
5.0	Fair	Low	Middle 1/3 of Fair (5.5-6.0)
	Fair	Medium	Lower 1/3 of Fair and top 1/3 of Poor (4.5-5.5)
	Poor		
	Poor	High	Lower 2/3 of Poor (<4.5)
	Poor		

**A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.*

The levels of need for each primary and secondary performance measure are combined to produce a weighted final need rating for each segment. Values of 0, 1, 2, and 3 are assigned to the initial need levels of None, Low, Medium, and High, respectively. A weight of 1.0 is applied to the Performance Index need and equal weights of 0.20 are applied to each need for each secondary performance measure. For directional secondary performance measures, each direction of travel receives a weight of 0.10.

Step 2: Need Refinement

In Step 2, the initial level of need for each segment is refined using the following information and engineering judgment:

- For segments with an initial need of None that contain hot spots, the level of need should be increased from None to Low
- For segments with an initial level of need where recently completed projects or projects under construction are anticipated to partially or fully address the identified need, the level of need should be reduced or eliminated as appropriate
- Programmed projects that are expected to partially or fully address an identified need are not justification to lower the initial need because the programmed projects may not be implemented as planned; in addition, further investigations may suggest that changes in the scope of a programmed project may be warranted

The resulting final needs are carried forward for further evaluation in Step 3.

Step 3: Contributing Factors

In Step 3, a more detailed review of the condition and performance data available from ADOT is conducted to identify contributing factors to the need. Typically, the same databases used to develop the baseline performance serve as the principle sources for the more detailed analysis. However, other supplemental databases may also be useful sources of information. The databases used for diagnostic analysis are listed below:

Pavement Performance Area

- Pavement Rating Database

Bridge Performance Area

- ABISS

Mobility Performance Area

- Highway Performance Monitoring System (HPMS) Database
- AZ Travel Demand Model (AZTDM)
- Real time traffic conditions database produced by American Digital Cartography Inc. (HERE) Database
- Highway Conditions Reporting System (HCRS) Database

Safety Performance Area

- Crash Database

Freight Performance Area

- HERE Database
- HCRS Database

In addition, other sources were considered to help identify the contributing factors such as:

- Maintenance history (from ADOT PeCoS for pavement), the level of past investments, or trends in historical data were used to help provide context for pavement and bridge history.
- Field observations from ADOT district personnel could be used to provide additional information regarding a need that has been identified.
- Previous studies can provide additional information regarding a need that has been identified.

Step 3 results in the identification of performance-based needs and contributing factors by segment (and MP locations, if appropriate) that can be addressed through investments in preservation, modernization, and expansion projects to improve corridor performance. See **Appendix D** for more information.

Step 4: Segment Review

In this step, the needs identified in Step 1 and refined in Step 2 are quantified for each segment to numerically estimate the level of need for each segment. Values of 0 to 3 were assigned to the final need levels (from Step 3) of None, Low, Medium, and High, respectively. A weighting factor is applied to the performance areas identified as emphasis areas and a weighted average need was calculated for each segment. The resulting average need score can be used to compare levels of need between segments within a corridor and between segments in different corridors.

Step 5: Corridor Needs

In this step, the needs and contributing factors for each performance area are reviewed on a segment-by-segment basis to identify actionable needs and to facilitate the formation of solution sets that address multiple performance areas and contributing factors. The intent of this process is to identify overlapping, common, and contrasting needs to help develop strategic solutions. This step will result in the identification of corridor needs by specific location.

3.3 Corridor Needs Assessment

This section documents the results of the needs assessment process described in the prior section. The needs in each performance area were classified as either None, Low, Medium, or High based on how well each segment performed in the existing performance analysis. The needs for each segment were numerically combined to estimate the average level of need for each segment of the corridor

The final needs assessments for each performance measure, along with the scales used in the analysis are shown in **Table 12** through **Table 16**.

Pavement Needs Refinements and Contributing Factors

- Pavement hot spots were identified in Segments 89U-4, 5, 8, and 9.
- No segments in the corridor had previously completed projects to adjust the final need.
- The final pavement segment needs are classified as Low for half of the corridor, where one segment (89U-9) is classified as high.
- All segments showed a "Low" level of historical investment, except 89U-5 which showed a "high" level of historical investment.
- See **Appendix D** for detailed information on contributing factors.

Table 12: Final Pavement Needs

Segment	Performance Score and Level of Need				Initial Segment Need	Hot Spots	Recently Completed Projects	Final Segment Need
	Pavement Index	Directional PSR		% Pavement Area Failure				
		NB	SB					
89U-1	4.29	4.19	3.04	0.00%	0.20	None	No Previous Completed Projects that supersede condition data	Low
89U-2	4.02	3.70	4.04	0.00%	0.00	None	No Previous Completed Projects that supersede condition data	None*
89U-3	3.73	3.47	3.28	0.00%	0.10	None	No Previous Completed Projects that supersede condition data	Low
89U-4	3.64	3.45	3.45	12.50%	0.20	MP 457-458	No Previous Completed Projects that supersede condition data	Low
89U-5	3.66	3.35	3.35	12.50%	0.20	MP 470-471, MP 474-475	No Previous Completed Projects that supersede condition data	Low
89U-6	4.04	3.73	3.73	0.00%	0.00	None	No Previous Completed Projects that supersede condition data	None*
89U-7	4.01	3.85	3.85	0.00%	0.00	None	No Previous Completed Projects that supersede condition data	None*
89U-8	3.72	3.71	3.71	8.70%	0.00	MP 524-525, MP 533-534	No Previous Completed Projects that supersede condition data	Low
89U-9	2.98	3.19	3.19	66.67%	2.80	MP 547-548, MP 549-550	No Previous Completed Projects that supersede condition data	High
89U-10	3.82	3.86	3.86	0.00%	0.00	None	No Previous Completed Projects that supersede condition data	None*

Level of Need (Score)	Performance Score Need Scale		Segment Level Need Scale
None* (0)	> 3.30	< 10%	0
Low (1)	3.30 – 3.10	10% - 15%	< 1.5
Medium (2)	3.10 – 2.70	15% - 25%	1.5 – 2.5
High (3)	< 2.70	> 25%	> 2.5

**A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.*

Bridge Needs Refinement and Contributing Factors

- Bridge needs occur due to under-performing bridges on three of the five segments with bridges.
- Bridge needs were identified at 4 of the total 11 bridges (36%).
- No bridges were identified as having potential repetitive investment issues.
- Three bridges have Structural Evaluation Ratings of 5, while Wash Bridge (MP 481.9) has a superstructure rating of 4.
- See **Appendix D** for detailed information on contributing factors.

Table 13: Final Bridge Needs

Segment	Performance Score and Level of Need				Initial Segment Need	Hot Spots	Recently Completed Projects	Final Segment Need
	Bridge Index	Sufficiency Rating	Lowest Bridge Rating	% of Deck on Functionally Obsolete Bridges				
89U-1	No Bridges				0.0	None	None	None*
89U-2	No Bridges				0.0	None	None	None*
89U-3	No Bridges				0.0	None	None	None*
89U-4	No Bridges				0.0	None	None	None*
89U-5	6.80	86.4	5	8.5%	0.2	None	None	Low
89U-6	4.46	58.0	4	0.0%	3.8	Wash Bridge	None	High
89U-7	6.00	77.1	6	0.0%	0.0	None	None	None*
89U-8	6.00	73.1	6	0.0%	0.0	None	None	None*
89U-9	6.00	67.7	6	0.0%	0.2	None	None	Low
89U-10	No Bridges				0.0	None	None	None*

Level of Need (Score)	Performance Score Need Scale				Segment Level Need Scale
None* (0)	> 6.0	> 70	> 6.0	< 21.0%	0
Low (1)	5.5 – 6.0	60 – 70	5.0	21.0% - 31.0%	< 1.5
Medium (2)	4.5 – 5.5	40 – 60	4.0	31.0% - 49.0%	1.5 – 2.5
High (3)	< 4.5	< 40	< 3.0	> 49.0%	> 2.5

**A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.*

Mobility Needs Refinement and Contributing Factors

- Low Mobility needs were identified on eight of the ten segments (80% of corridor).
- High Mobility needs were identified on Segment 89U-9 primarily due to the Future Daily V/C score
- A majority of the needs are directional PTI issues, and bicycle accommodation.
- See **Appendix D** for detailed information on contributing factors.

Table 14: Final Mobility Needs

Segment	Performance Score and Level of Need										Initial Segment Need	Recently Completed Projects	Final Segment Need
	Mobility Index	Future Daily V/C	Existing Peak Hour V/C		Closure Extent		Directional TTI		Directional PTI		% Bicycle Accommodation			
			NB	SB	NB	SB	NB	SB	NB	SB				
89U-1[b]	0.52	0.63	0.36	0.38	0.53	0.10	1.12	1.11	2.23	2.29	19%	0.8	None	Low
89U-2[a]	0.15	0.20	0.09	0.09	0.25	0.01	1.02	1.03	1.24	1.42	97%	0.1	None	Low
89U-3[a]	0.26	0.32	0.21	0.21	0.00	0.04	1.00	1.01	1.14	1.25	89%	0.0	None	None
89U-4[a]	0.28	0.35	0.19	0.19	0.00	0.03	1.11	1.17	2.38	2.16	94%	0.6	FY15 H705601C: South of Gray Mountain, Passing Lane Construction (MP 452-455.06)	Low
89U-5[b]	0.37	0.46	0.24	0.24	0.13	0.05	1.10	1.13	1.74	2.07	75%	0.2	None	Low
89U-6[a]	0.16	0.19	0.15	0.14	0.02	0.01	1.03	1.01	1.50	1.28	99%	0.2	None	Low
89U-7[a]	0.11	0.15	0.06	0.06	0.03	0.02	1.01	1.05	1.53	1.60	88%	0.5	None	Low
89U-8[a]	0.28	0.34	0.17	0.17	0.31	0.09	1.21	1.23	2.69	2.92	2%	1.3	None	Low
89U-9[b]	0.85	1.05	0.54	0.56	0.07	0.07	1.30	1.38	2.86	3.16	91%	2.6	None	High
89U-10[a]	0.27	0.33	0.12	0.12	0.06	0.00	1.17	1.18	2.40	2.43	3%	1.2	None	Low

Level of Need (Score)	Performance Score Need Scale					Segment Level Need Scale
None* (0)	≤ 0.77 (Urban) ≤ 0.63 (Rural)	< 0.35	< 1.21[a] < 1.53[b]	< 1.37[a] < 4.00[b]	> 80%	0
Low (1)	0.77 - 0.83 (Urban) 0.63 - 0.69 (Rural)	0.35 – 0.49	1.21 – 1.27[a] 1.53 – 1.77[b]	1.37 – 1.43[a] 4.00 – 5.00[b]	70% - 80%	< 1.5
Medium (2)	0.83 - 0.95 (Urban) 0.69 - 0.83 (Rural)	0.49 – 0.75	1.27 – 1.39[a] 1.77 – 2.23[b]	1.43 – 1.57[a] 5.00 – 7.00[b]	50% - 70%	1.5 - 2.5
High (3)	≥ 0.95 (Urban) ≥ 0.83 (Rural)	> 0.75	> 1.39[a] > 2.23[b]	> 1.57[a] > 7.00[b]	< 50%	> 2.5

a: Uninterrupted b: Interrupted

**A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.*

Safety Needs

- High Safety Needs were identified on four of the10 segments (40% of corridor).
- No safety hot spots were identified on the corridor
- See **Appendix D** for detailed information on contributing factors.

Table 15: Final Safety Needs

Segment	Performance Score and Level of Need				Initial Segment Need	Hot Spots	Recently Completed Projects	Final Segment Need
	Safety Index	Directional Safety Index		% of Fatal + Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Area Behaviors				
		NB	SB					
89U-1[a]	0.40	0.76	0.04	17%	0.0	None	None	None*
89U-2[b]	1.13	2.01	0.25	31%	2.3	None	None	Medium
89U-3[c]	0.05	0.10	0.00	Insufficient Data	0.0	None	None	None*
89U-4[c]	0.77	1.53	0.00	Insufficient Data	0.3	None	None	Low
89U-5[c]	1.43	1.48	1.38	Insufficient Data	4.2	None	None	High
89U-6[c]	0.48	0.11	0.86	Insufficient Data	0.0	None	FY13 H864501C: US89 - SR98, New Facilities - Emergency Detour (MP 495-498)	None*
89U-7[c]	0.04	0.08	0.00	Insufficient Data	0.0	None	FY13 H864101P: US89, Emergency Slope Repair- US89 (MP 523-526.5) FY14 H803801C: US89 at 89A, Intersection Lighting (MP 523-524.23)	None*
89U-8[c]	1.19	1.29	1.09	71%	4.1	None	FY13 H864101P: US89, Emergency Slope Repair- US89 (MP 523-526.5) FY15 H845601C: Page Roundabout at Haul Rad, System Enhancement - Safety Improvement (MP 546-546.99)	High
89U-9[c]	2.49	0.51	4.47	17%	3.3	None	None	High
89U-10[c]	0.12	0.12	0.12	Insufficient Data	0.0	None	None	None*

Level of Need (Score)		Performance Score Needs Scale			Segment Level Need Scale
None* (0)	a	< 0.93	< 45%	< 7%	0
	b	< 0.92	< 47%	< 5%	
	c	< 0.98	< 53%	< 6%	
Low (1)	a	0.93 - 1.06	45% - 48%	7% - 8%	≤ 1.5
	b	0.92 - 1.07	47% - 50%	5% - 6%	
	c	0.98 – 1.02	53% - 55%	6% - 7%	
Medium (2)	a	1.06 – 1.33	48% - 54%	8% - 11%	1.5 - 2.5
	b	1.07 - 1.38	50% - 57%	6% - 8%	
	c	1.02 – 1.10	55% - 59%	7% - 8%	
High (3)	a	≥ 1.34	≥ 55%	≥ 12%	≥ 2.5
	b	≥ 1.39	≥ 58%	≥ 9%	
	c	≥ 1.11	≥ 60%	≥ 9%	

a: 4 or 5 Lane Undivided Highway
b: 2 or 3 or 4 Lane Divided Highway
c: 2 or 3 Lane Undivided Highway
**A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.*

Freight Needs

- Freight needs are Low for four segments, where three segments are identified as high need.
- Elevated values for TTTI, TPTI, and Closures are generally shown near segment 89U-8.
- Closure durations are higher than the statewide average in NB Segments 89U-1, 2, and 8; SB Segment 89U-9.
- See **Appendix D** for detailed information on contributing factors.

Table 16: Final Freight Needs

Segment #	Performance Score and Level of Need								Initial Segment Need	Hot Spots	Recently Completed Projects	Final Segment Need
	Freight Index	Directional TTTI		Directional TPTI		Closure Duration		Bridge Vertical Clearance				
		NB	SB	NB	SB	NB	SB					
89U-1[b]	0.42	1.19	1.16	2.66	2.11	2620.49	18.18	No UP	0.3	None	None	Low
89U-2[a]	0.68	1.10	1.16	1.38	1.58	1466.09	1.09	No UP	2.7	None	None	High
89U-3[a]	0.76	1.05	1.11	1.22	1.40	0.00	6.57	No UP	0.1	None	FY15 H705601C: South of Gray Mountain, Passing Lane Construction (MP 452-455.06)	Low
89U-4[a]	0.38	1.22	1.32	2.70	2.54	0.00	2.95	No UP	3.9	None	None	High
89U-5[b]	0.55	1.14	1.20	1.65	1.99	17.75	7.90	No UP	0.0	None	None	None*
89U-6[a]	0.77	1.07	1.06	1.29	1.30	7.13	2.54	No UP	0.0	None	None	None*
89U-7[a]	0.70	1.05	1.07	1.43	1.41	8.37	1.47	No UP	1.2	None	None	Low
89U-8[a]	0.41	1.27	1.31	2.63	2.27	175175.61	16.97	No UP	4.3	None	None	High
89U-9[b]	0.28	1.40	1.43	3.19	4.09	11.53	192.53	No UP	1.4	None	None	Low
89U-10[b]	0.48	1.21	1.19	2.01	2.14	10.74	0.00	No UP	0.0	None	None	None*

Level of Need (Score)		Performance Score Need Scale					Segment Level Need Scale
None* (0)	a b	> 0.74 > 0.28	< 1.21 < 1.53	< 1.37 < 4.00	< 71.07	> 16.33	0
Low (1)	a b	0.70 - 0.74 0.22 – 0.28	1.21 - 1.27 1.53 – 1.77	1.37 - 1.43 4.00 – 5.00	71.07 - 97.97	16.17 - 16.33	< 1.5
Medium (2)	a b	0.64 - 0.70 0.12 – 0.22	1.27 - 1.39 1.77 – 2.23	1.43 - 1.57 5.00 – 7.00	97.97 - 151.75	15.83 - 16.17	1.5 - 2.5
High (3)	a b	< 0.12 < 0.64	> 1.39 > 2.23	> 1.57 > 7.00	> 151.75	< 15.83	> 2.5

a: Uninterrupted Flow b: Interrupted Flow

**A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.*

Segment Review

The needs for each segment were combined to numerically estimate the average level of need for each segment of the corridor. **Table 17** provides a summary of needs for each segment across all performance areas, with the average need score for each segment presented in the last row of the table. A weighting factor of 1.5 is applied to the need scores of the performance areas identified as emphasis areas (Mobility, Safety, and Freight for the US 89 Corridor). There are five segments with a Medium overall average need, and five segments with a Low overall average need.

Table 17: Summary of Needs by Segment

Performance Area	Segment Number and Mileposts (MP)									
	89U-1	**89U-2**	**89U-3**	**89U-4**	**89U-5**	**89U-6**	**89U-7**	**89U-8**	**89U-9**	**89U-10**
	MP 420-428	**MP 428-442**	**MP 442-457**	**MP 457-465**	**MP 465-481**	**MP 481-498**	**MP 498-524**	**MP 524-547**	**MP 547-550**	**MP 550-557**
Pavement*	Low	None+	Low	Low	Low	None+	None+	Low	High	None+
Bridge	None+	None+	None+	None+	Low	High	None+	None+	Low	None+
Mobility*	Low	Low	None+	Low	Low	Low	Low	Low	High	Low
Safety*	None+	Medium	None+	Low	High	None+	None+	High	High	None+
Freight	Low	High	Low	High	None+	None+	Low	High	Low	None+
Average Need (0-3)	**0.62**	**1.15**	**0.38**	**1.15**	**1.31**	**0.69**	**0.38**	**1.62**	**2.38**	**0.23**

* Identified as Emphasis Area

N/A indicates insufficient or no data available to determine level of need

+ A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study

Scale	
None	< 0.1
Low	0.1 - 1.0
Medium	1.0 - 2.0
High	> 2.0

Summary of Corridor Needs

The needs in each performance area are shown in **Figure 21** and summarized below:

Pavement Needs

- The Pavement Performance Area is an emphasis area for US 89;
- Five of the ten segments (89U-1, 89U-3, 89U-4, 89U-5, and 89U-8) of the US 89 Corridor exhibit a Low level of Pavement need
- All segments showed a “Low” level of historical investment, except 89U-5 which showed a “high” level of historical investment.

Bridge Needs

- The Bridge Performance Area is not an emphasis area for US 89.
- Two of the ten segments (89U-5 and 89U-9) exhibit a low level of need.
- One of the ten segments (89U-7) exhibits a high level of need.
- None of the bridges exhibit historical issues.

Mobility Needs

- The Mobility Performance Area is an emphasis area for US 89.
- One segment (89U-9) exhibits a High level of need.
- Eight segments (89U-1, 89U-2, 89U-4-8, and 89U-10) exhibit a Low level of need.
- Segment 89U-9 exhibits an elevated Mobility Index score due to current and future V/C

Safety Needs

- The Safety Performance Area is an emphasis area for US 89.
- Safety needs exist on five of the ten segments.
- Three of the ten segments (89U-5, 89U-8 and 9) exhibit a High level of need.
- One segment (89U-4) exhibits a Low level of need.

Freight Needs

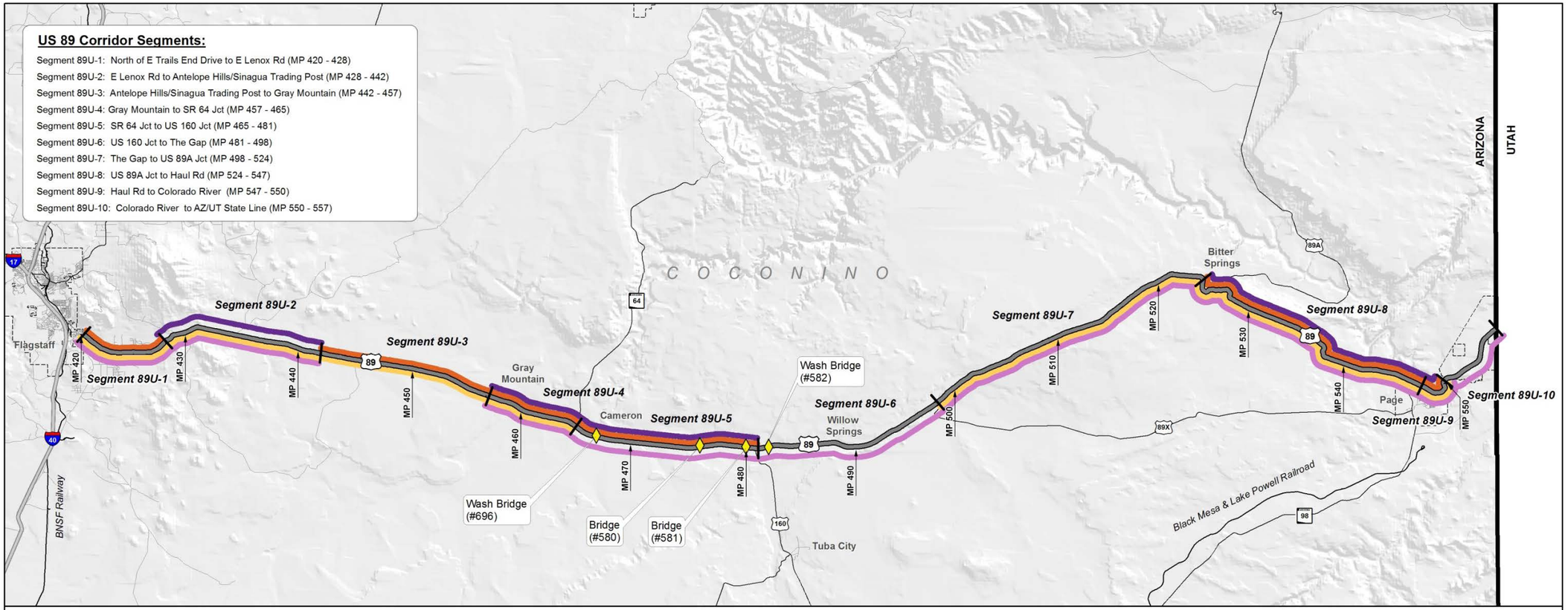
- The Freight Performance Area is not an emphasis area for US 89.
- Three of the ten segments (89U-2, 89U-4, and 89U-8) exhibit a “High” level of need.
- Four of the ten segments (89U-1, 89U-3, 89U-7, and 89U-9) exhibit a “Low” level of need.
- Similar to Mobility, 100% of road closures are due to incidents/accidents and impact freight performance

Overlapping Needs

This section identifies overlapping performance needs on the US 89 Corridor, which provides guidance to develop strategic solutions that address more than one performance area with elevated (i.e., Medium or High) levels of need. Completing projects that address multiple needs presents the opportunity to more effectively improve overall performance. A summary of the overlapping needs that relate to locations with elevated levels of need is provided below:

- One segment (89U-9) contains needs in all five performance areas with elevated need in Pavement, Mobility, and Safety.
- Segments 89U-2 and 89U-8 show elevated needs in Safety and Freight

Figure 21: Corridor Needs Summary



Performance Area	89U-1	89U-2	89U-3	89U-4	89U-5	89U-6	89U-7	89U-8	89U-9	89U-10
	MP 420-428	MP 428-442	MP 442-457	MP 457-465	MP 465-481	MP 481-498	MP 498-524	MP 524-547	MP 547-550	MP 550-557
Pavement (Emphasis Area)	Low	None*	Low	Low	Low	None*	None*	Low	High	None*
Bridge	None*	None*	None*	None*	Low	High	None*	None*	Low	None*
Mobility (Emphasis Area)	Low	Low	None*	Low	Low	Low	Low	Low	High	Low
Safety (Emphasis Area)	None*	Medium	None*	Low	High	None*	None*	High	High	None*
Freight	Low	High	Low	High	None*	None*	Low	High	Low	None*
Average Need	0.62	1.15	0.38	1.15	1.31	0.69	0.38	1.62	2.38	0.23

*A segment need rating of 'None' does not indicate a lack of needed improvements; rather, it indicates that the segment performance score exceeds the established performance thresholds and strategic solutions for that segment will not be developed as part of this study.

US 89 Corridor Profile Study: I-40 to Utah State Line
Corridor Needs Summary

N
Miles
0 5 10 15 20

Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary

NEEDS SUMMARY
SAFETY
PAVEMENT
FREIGHT
MOBILITY
BRIDGE

LEVEL OF NEED

None*	< 0.1
Low	0.1 - 1.0
Medium	1.0 - 2.0
High	> 2.0

Appendix A: Corridor Performance Maps

This appendix contains maps of each primary and secondary measure associated with the five performance areas for the US 89 Corridor. The following are the areas and maps included:

Pavement Performance Area:

- Pavement Index and Hot Spots
- Pavement Serviceability (directional)
- Percentage of Pavement Area Failure

Bridge Performance Area:

- Bridge Index and Hot Spots
- Bridge Sufficiency
- Percent of Deck Area on Functionally Obsolete Bridges
- Lowest Bridge Rating

Mobility Performance Area:

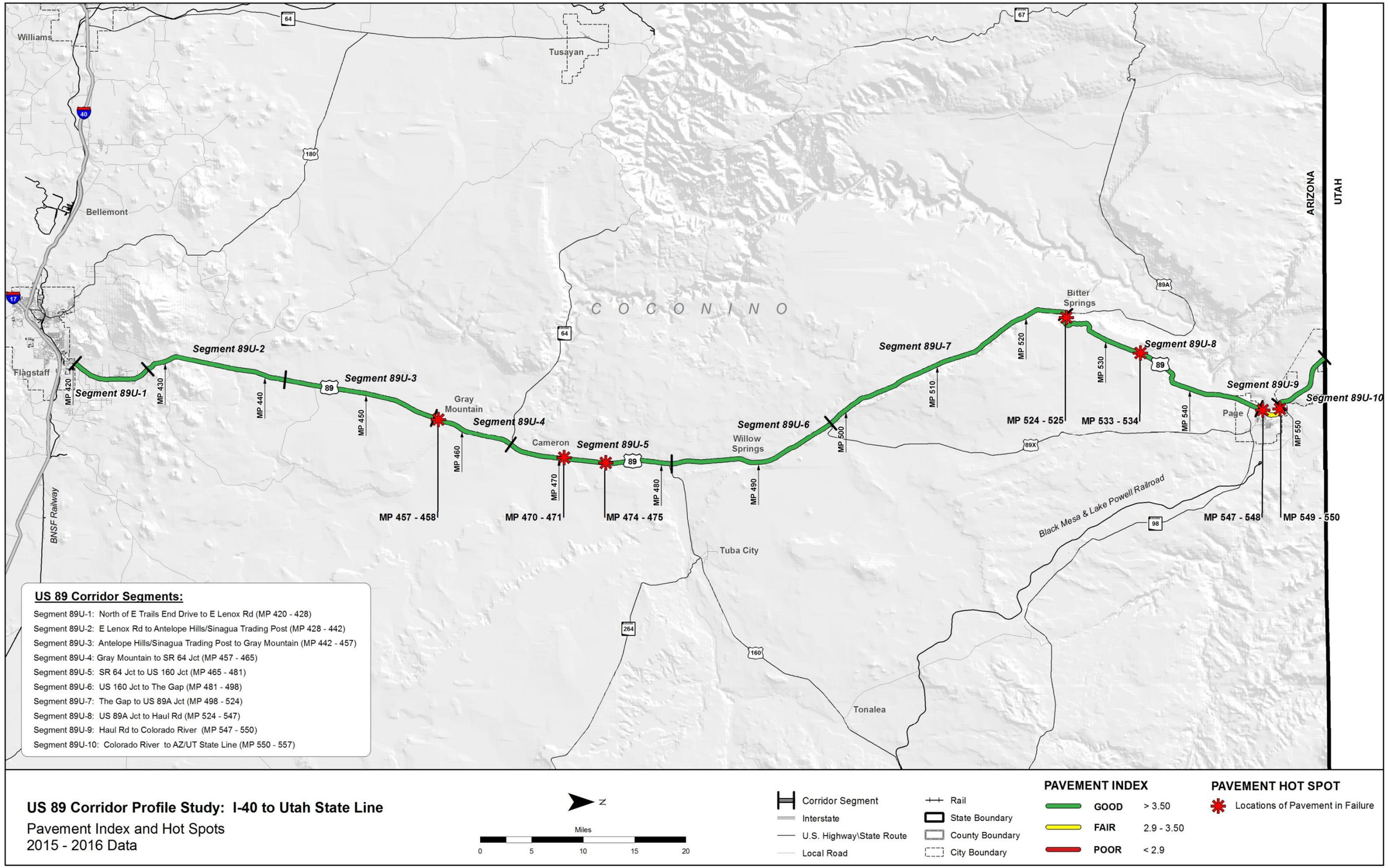
- Mobility Index
- Future Daily V/C
- Existing Peak V/C (directional)
- Average Instances Per Year a Given Milepost is Closed Per Segment Mile
- All Vehicles Travel Time Index
- All Vehicles Planning Time Index
- Multimodal Opportunities
- Percentage of Bicycle Accommodation

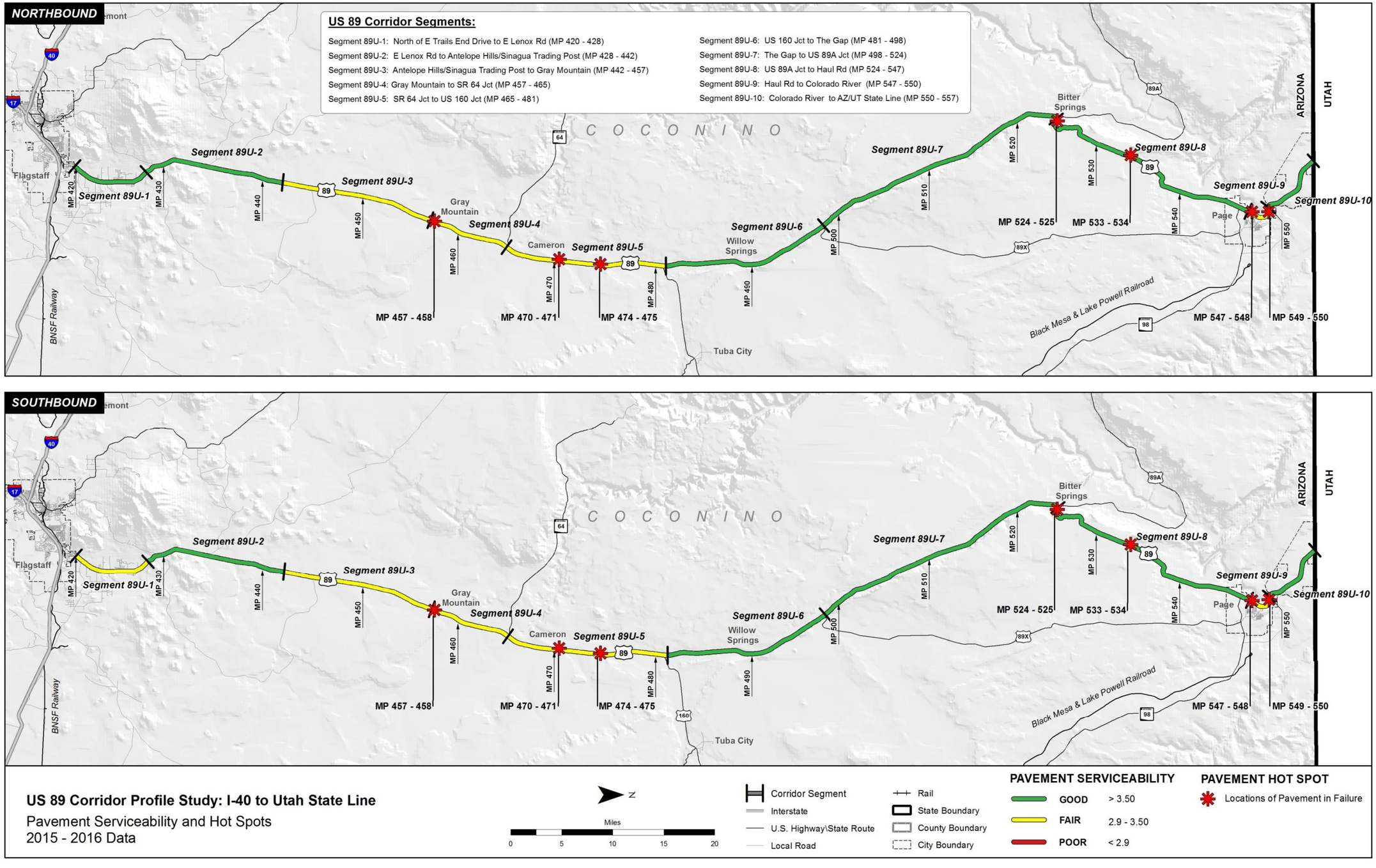
Safety Performance Area:

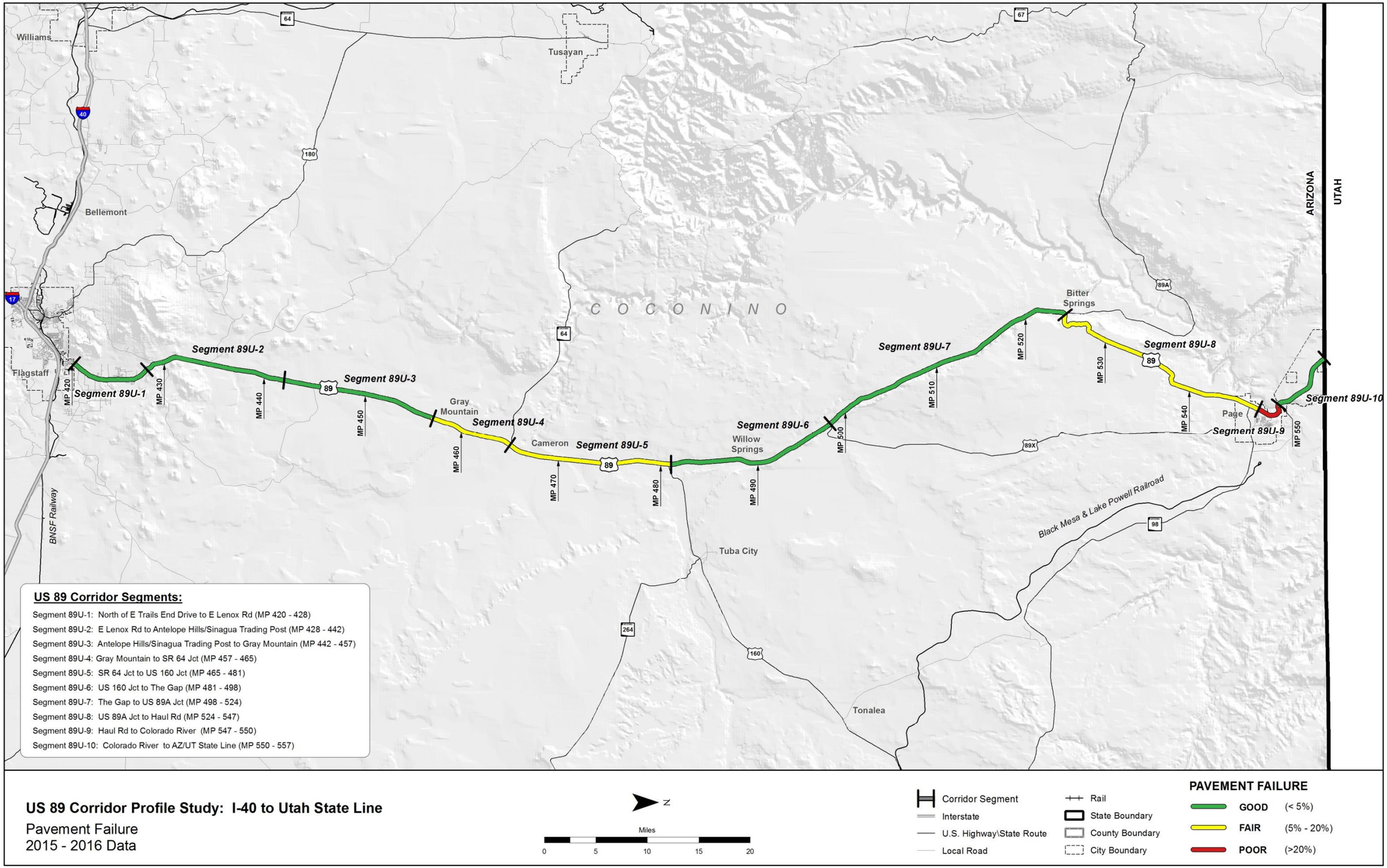
- Safety Index and Hot Spots
- Safety Index and Hot Spots (directional)
- Relative Frequency of Fatal + Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Areas Behaviors Compared to the Statewide Average for Similar Segments

Freight Performance Area:

- Freight Index and Hot Spots
- Truck Travel Time Index
- Truck Planning Time Index
- Average Minutes Per Year Given Milepost is Closed Per Segment Mile
- Bridge Vertical Clearance


Williams
Tusayan
Bellemont
Flagstaff
COCONINO
ARIZONA
UTAH
Bitter Springs
Gray Mountain
Cameron
Willow Springs
Page
Tuba City
Tonalea
BNSF Railway
Black Mesa & Lake Powell Railroad
Segment 89U-1
Segment 89U-2
Segment 89U-3
Segment 89U-4
Segment 89U-5
Segment 89U-6
Segment 89U-7
Segment 89U-8
Segment 89U-9
Segment 89U-10
MP 420
MP 430
MP 440
MP 450
MP 460
MP 470
MP 480
MP 490
MP 500
MP 510
MP 520
MP 530
MP 540
MP 550
MP 457 - 458
MP 470 - 471
MP 474 - 475
MP 524 - 525
MP 533 - 534
MP 547 - 548
MP 549 - 550
US 89 Corridor Segments:
Segment 89U-1: North of E Trails End Drive to E Lenox Rd (MP 420 - 428)
Segment 89U-2: E Lenox Rd to Antelope Hills/Sinagua Trading Post (MP 428 - 442)
Segment 89U-3: Antelope Hills/Sinagua Trading Post to Gray Mountain (MP 442 - 457)
Segment 89U-4: Gray Mountain to SR 64 Jct (MP 457 - 465)
Segment 89U-5: SR 64 Jct to US 160 Jct (MP 465 - 481)
Segment 89U-6: US 160 Jct to The Gap (MP 481 - 498)
Segment 89U-7: The Gap to US 89A Jct (MP 498 - 524)
Segment 89U-8: US 89A Jct to Haul Rd (MP 524 - 547)
Segment 89U-9: Haul Rd to Colorado River (MP 547 - 550)
Segment 89U-10: Colorado River to AZ/UT State Line (MP 550 - 557)
US 89 Corridor Profile Study: I-40 to Utah State Line
Pavement Index and Hot Spots
2015 - 2016 Data
N
Miles
0 5 10 15 20
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
PAVEMENT INDEX
GOOD > 3.50
FAIR 2.9 - 3.50
POOR < 2.9
PAVEMENT HOT SPOT
Locations of Pavement in Failure


NORTHBOUND
SOUTHBOUND
US 89 Corridor Segments:
Segment 89U-1: North of E Trails End Drive to E Lenox Rd (MP 420 - 428)
Segment 89U-2: E Lenox Rd to Antelope Hills/Sinagua Trading Post (MP 428 - 442)
Segment 89U-3: Antelope Hills/Sinagua Trading Post to Gray Mountain (MP 442 - 457)
Segment 89U-4: Gray Mountain to SR 64 Jct (MP 457 - 465)
Segment 89U-5: SR 64 Jct to US 160 Jct (MP 465 - 481)
Segment 89U-6: US 160 Jct to The Gap (MP 481 - 498)
Segment 89U-7: The Gap to US 89A Jct (MP 498 - 524)
Segment 89U-8: US 89A Jct to Haul Rd (MP 524 - 547)
Segment 89U-9: Haul Rd to Colorado River (MP 547 - 550)
Segment 89U-10: Colorado River to AZ/UT State Line (MP 550 - 557)
COCONINO
ARIZONA
UTAH
Flagstaff
Gray Mountain
Cameron
Willow Springs
Bitter Springs
Page
Tuba City
BNSF Railway
Black Mesa & Lake Powell Railroad
MP 420
MP 430
MP 440
MP 450
MP 457 - 458
MP 460
MP 470
MP 470 - 471
MP 474 - 475
MP 480
MP 490
MP 500
MP 510
MP 520
MP 524 - 525
MP 530
MP 533 - 534
MP 540
MP 547 - 548
MP 550
MP 549 - 550
Segment 89U-1
Segment 89U-2
Segment 89U-3
Segment 89U-4
Segment 89U-5
Segment 89U-6
Segment 89U-7
Segment 89U-8
Segment 89U-9
Segment 89U-10
40
17
64
89
89A
89X
98
160
US 89 Corridor Profile Study: I-40 to Utah State Line
Pavement Serviceability and Hot Spots
2015 - 2016 Data
N
Miles
0 5 10 15 20
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
PAVEMENT SERVICEABILITY
GOOD > 3.50
FAIR 2.9 - 3.50
POOR < 2.9
PAVEMENT HOT SPOT
Locations of Pavement in Failure


Williams
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Bellemont
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COCONINO
ARIZONA
UTAH
Bitter Springs
Gray Mountain
Cameron
Willow Springs
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Tuba City
Tonalea
BNSF Railway
Black Mesa & Lake Powell Railroad
Segment 89U-1
Segment 89U-2
Segment 89U-3
Segment 89U-4
Segment 89U-5
Segment 89U-6
Segment 89U-7
Segment 89U-8
Segment 89U-9
Segment 89U-10
MP 420
MP 430
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MP 460
MP 470
MP 480
MP 490
MP 500
MP 510
MP 520
MP 530
MP 540
MP 550
64
67
180
40
17
89
89A
89X
98
264
160
US 89 Corridor Segments:
Segment 89U-1: North of E Trails End Drive to E Lenox Rd (MP 420 - 428)
Segment 89U-2: E Lenox Rd to Antelope Hills/Sinagua Trading Post (MP 428 - 442)
Segment 89U-3: Antelope Hills/Sinagua Trading Post to Gray Mountain (MP 442 - 457)
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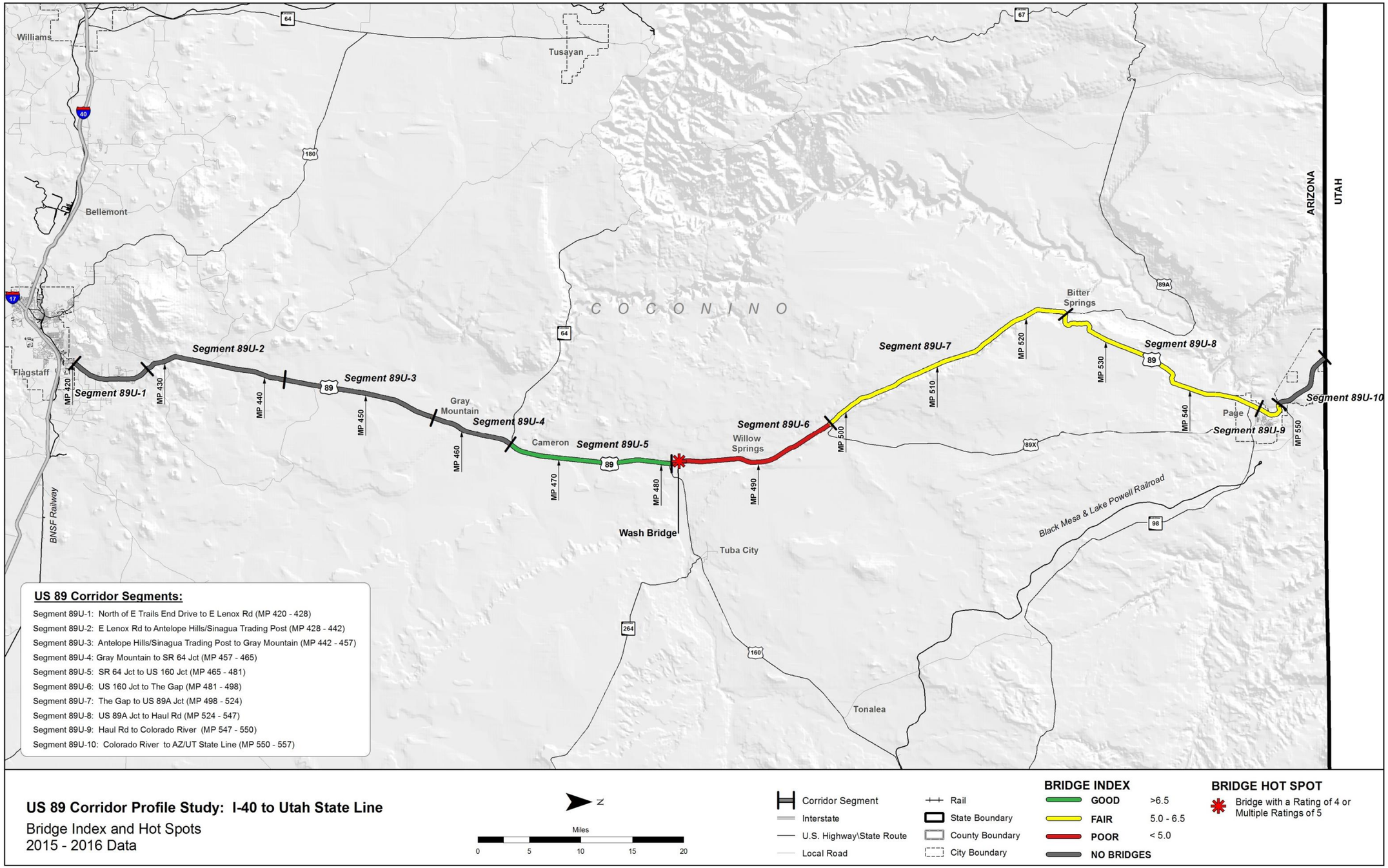
Segment 89U-5: SR 64 Jct to US 160 Jct (MP 465 - 481)
Segment 89U-6: US 160 Jct to The Gap (MP 481 - 498)
Segment 89U-7: The Gap to US 89A Jct (MP 498 - 524)
Segment 89U-8: US 89A Jct to Haul Rd (MP 524 - 547)
Segment 89U-9: Haul Rd to Colorado River (MP 547 - 550)
Segment 89U-10: Colorado River to AZ/UT State Line (MP 550 - 557)
US 89 Corridor Profile Study: I-40 to Utah State Line
Pavement Failure
2015 - 2016 Data
N
Miles
0
5
10
15
20
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
PAVEMENT FAILURE
GOOD (< 5%)
FAIR (5% - 20%)
POOR (>20%)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Segment 89U-1
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Gray Mountain
Cameron
Willow Springs
Bitter Springs
Page
Wash Bridge
Tuba City
Tonalea
Black Mesa & Lake Powell Railroad
US 89 Corridor Segments:
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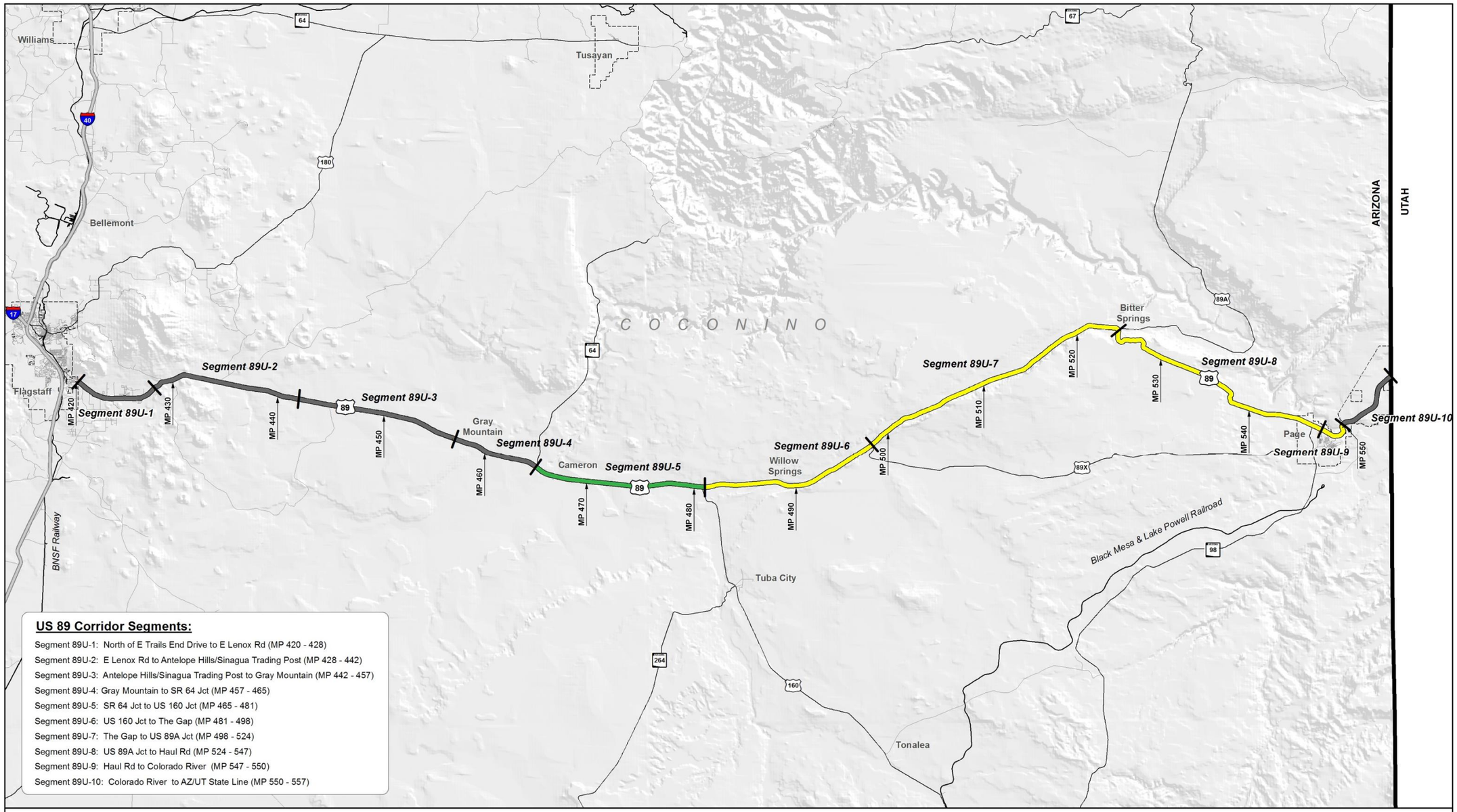
Segment 89U-6: US 160 Jct to The Gap (MP 481 - 498)
Segment 89U-7: The Gap to US 89A Jct (MP 498 - 524)
Segment 89U-8: US 89A Jct to Haul Rd (MP 524 - 547)
Segment 89U-9: Haul Rd to Colorado River (MP 547 - 550)
Segment 89U-10: Colorado River to AZ/UT State Line (MP 550 - 557)
US 89 Corridor Profile Study: I-40 to Utah State Line
Bridge Index and Hot Spots
2015 - 2016 Data
N
Miles
0 5 10 15 20
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
BRIDGE INDEX
GOOD >6.5
FAIR 5.0 - 6.5
POOR < 5.0
NO BRIDGES
BRIDGE HOT SPOT
Bridge with a Rating of 4 or Multiple Ratings of 5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Segment 89U-1
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Segment 89U-6
Segment 89U-7
Segment 89U-8
Segment 89U-9
Segment 89U-10
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US 89 Corridor Segments:
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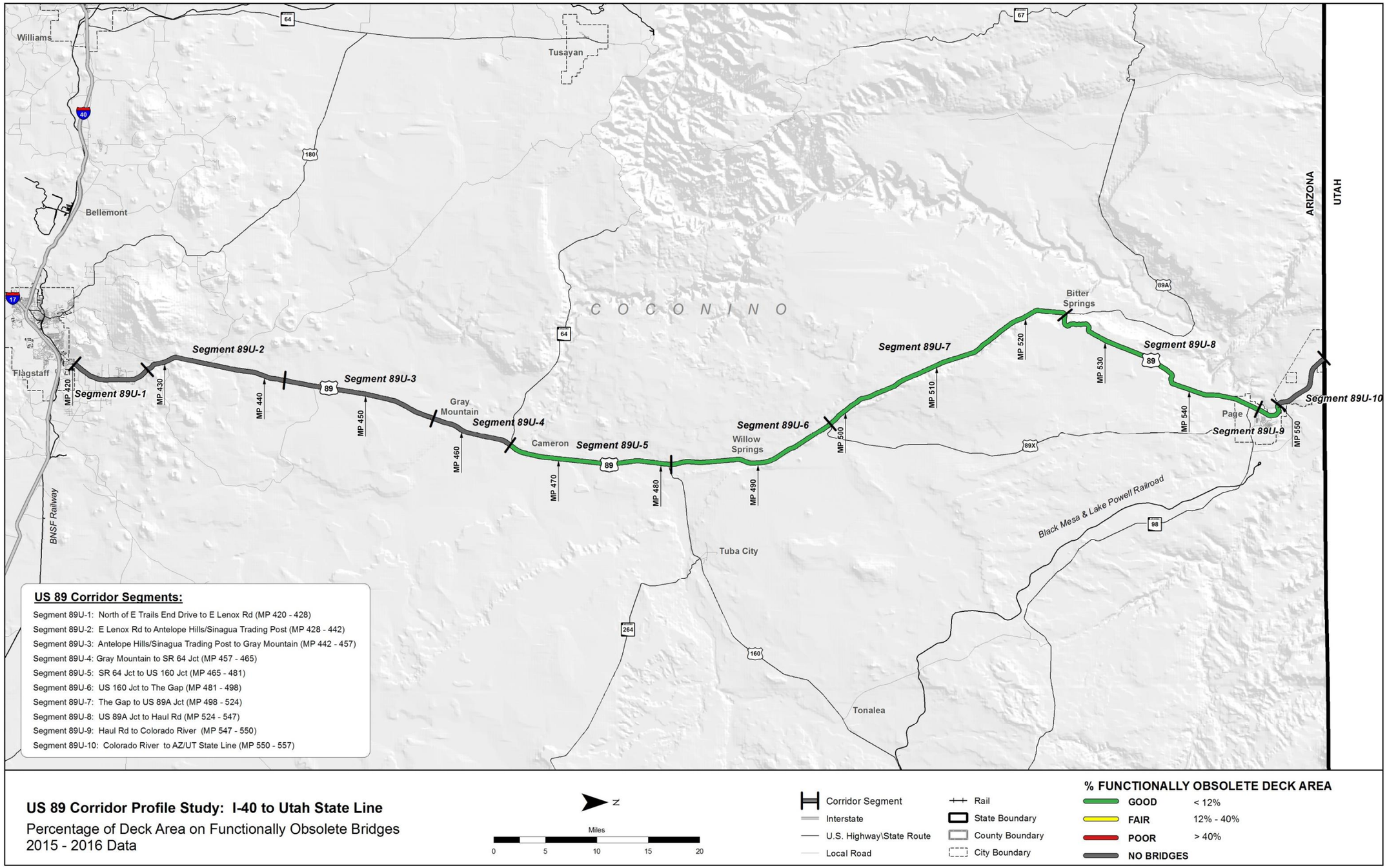
Segment 89U-5: SR 64 Jct to US 160 Jct (MP 465 - 481)
Segment 89U-6: US 160 Jct to The Gap (MP 481 - 498)
Segment 89U-7: The Gap to US 89A Jct (MP 498 - 524)
Segment 89U-8: US 89A Jct to Haul Rd (MP 524 - 547)
Segment 89U-9: Haul Rd to Colorado River (MP 547 - 550)
Segment 89U-10: Colorado River to AZ/UT State Line (MP 550 - 557)
US 89 Corridor Profile Study: I-40 to Utah State Line
Bridge Sufficiency
2015 - 2016 Data
N
Miles
0 5 10 15 20
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
BRIDGE SUFFICIENCY
GOOD > 80
FAIR 50 - 80
POOR < 50
NO BRIDGES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Willow Springs
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Tuba City
Tonalea
BNSF Railway
Black Mesa & Lake Powell Railroad
Segment 89U-1
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Segment 89U-3
Segment 89U-4
Segment 89U-5
Segment 89U-6
Segment 89U-7
Segment 89U-8
Segment 89U-9
Segment 89U-10
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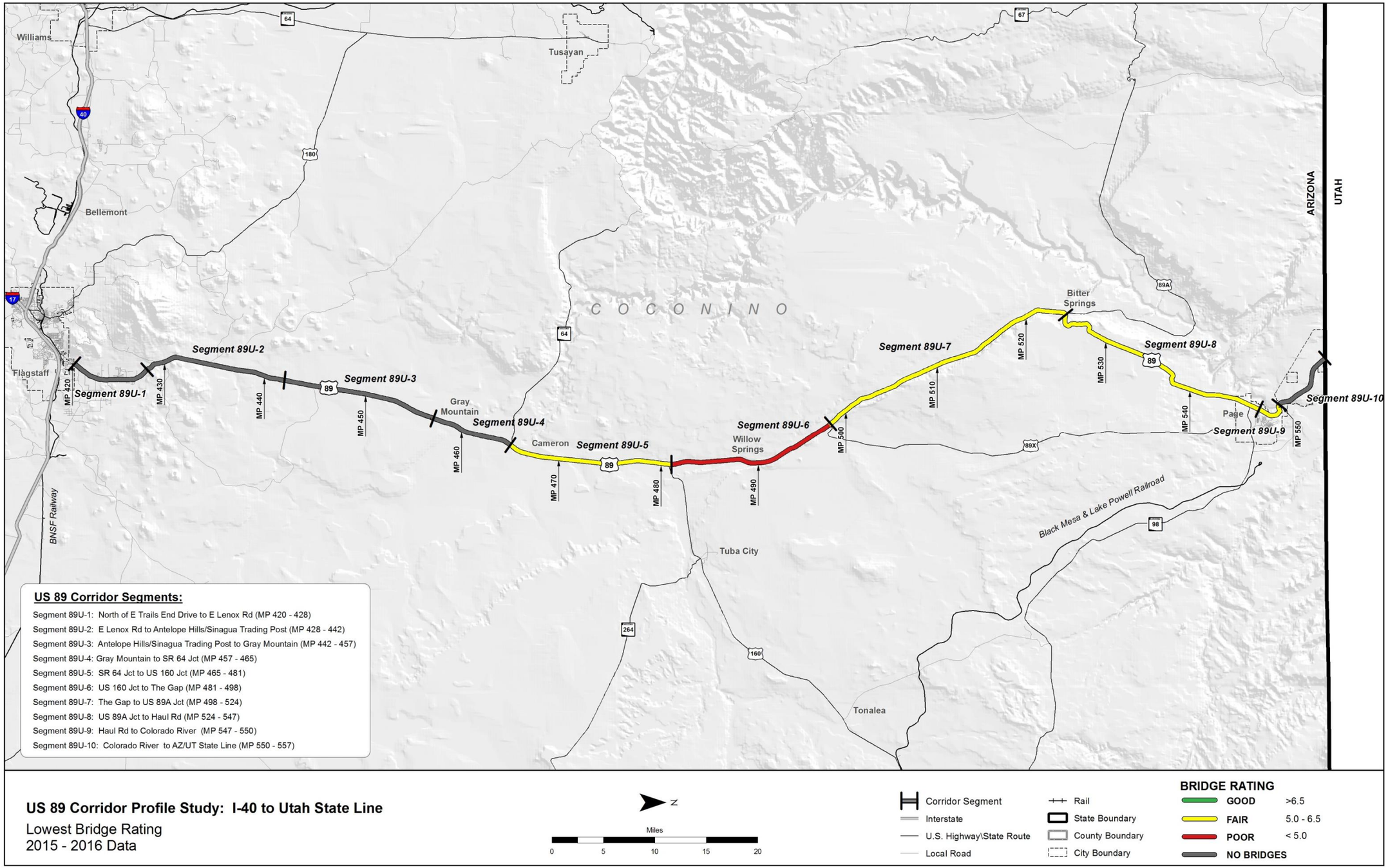
Segment 89U-6: US 160 Jct to The Gap (MP 481 - 498)
Segment 89U-7: The Gap to US 89A Jct (MP 498 - 524)
Segment 89U-8: US 89A Jct to Haul Rd (MP 524 - 547)
Segment 89U-9: Haul Rd to Colorado River (MP 547 - 550)
Segment 89U-10: Colorado River to AZ/UT State Line (MP 550 - 557)
US 89 Corridor Profile Study: I-40 to Utah State Line
Percentage of Deck Area on Functionally Obsolete Bridges
2015 - 2016 Data
N
Miles
0 5 10 15 20
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
% FUNCTIONALLY OBSOLETE DECK AREA
GOOD < 12%
FAIR 12% - 40%
POOR > 40%
NO BRIDGES


Williams
Tusayan
Bellemont
Flagstaff
COCONINO
ARIZONA
UTAH
Bitter Springs
Gray Mountain
Cameron
Willow Springs
Page
Tuba City
Tonalea
Segment 89U-1
Segment 89U-2
Segment 89U-3
Segment 89U-4
Segment 89U-5
Segment 89U-6
Segment 89U-7
Segment 89U-8
Segment 89U-9
Segment 89U-10
MP 420
MP 430
MP 440
MP 450
MP 460
MP 470
MP 480
MP 490
MP 500
MP 510
MP 520
MP 530
MP 540
MP 550
BNSF Railway
Black Mesa & Lake Powell Railroad
US 89 Corridor Segments:
Segment 89U-1: North of E Trails End Drive to E Lenox Rd (MP 420 - 428)
Segment 89U-2: E Lenox Rd to Antelope Hills/Sinagua Trading Post (MP 428 - 442)
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Segment 89U-5: SR 64 Jct to US 160 Jct (MP 465 - 481)
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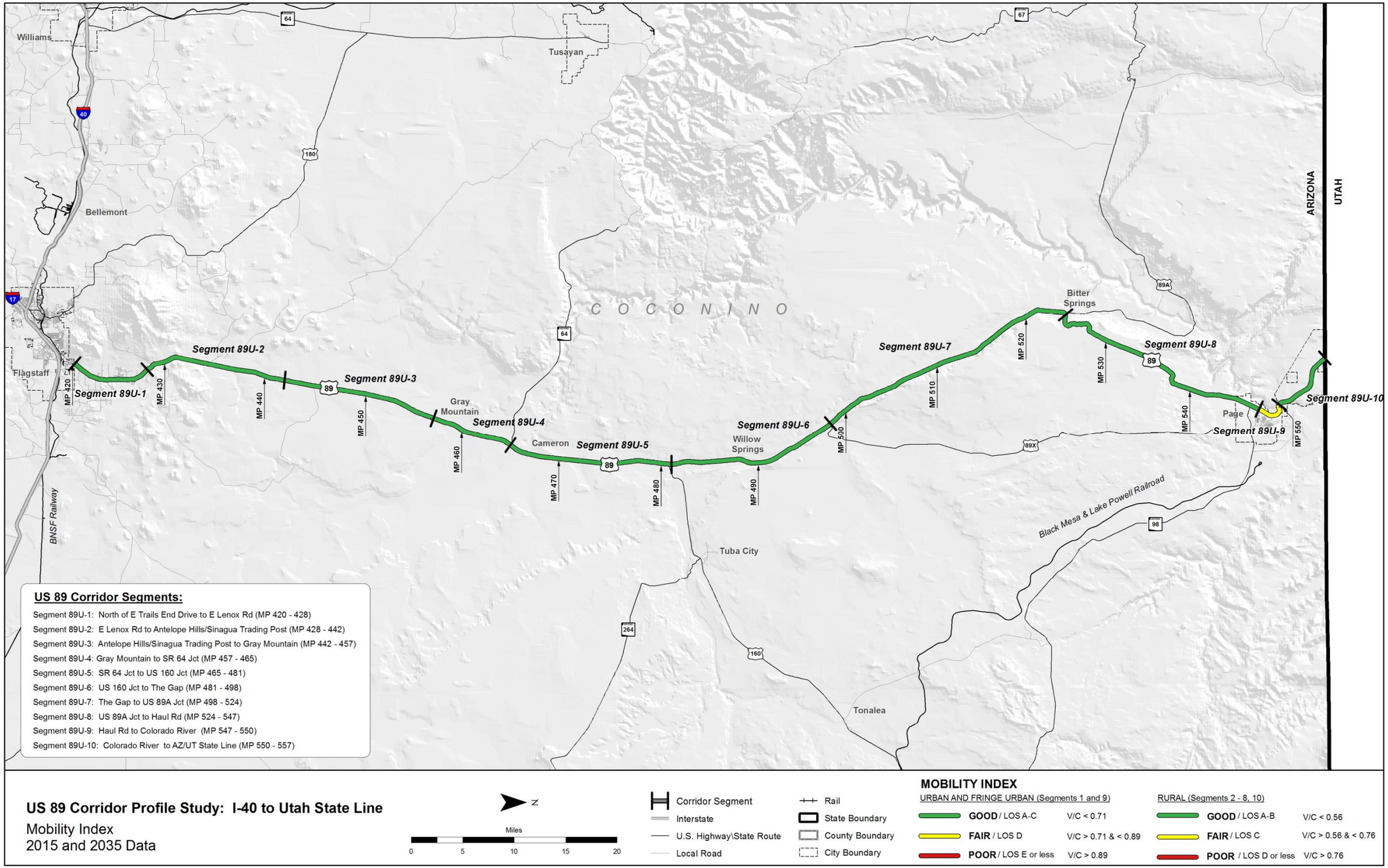
Segment 89U-7: The Gap to US 89A Jct (MP 498 - 524)
Segment 89U-8: US 89A Jct to Haul Rd (MP 524 - 547)
Segment 89U-9: Haul Rd to Colorado River (MP 547 - 550)
Segment 89U-10: Colorado River to AZ/UT State Line (MP 550 - 557)
US 89 Corridor Profile Study: I-40 to Utah State Line
Lowest Bridge Rating
2015 - 2016 Data
N
Miles
0 5 10 15 20
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
BRIDGE RATING
GOOD >6.5
FAIR 5.0 - 6.5
POOR < 5.0
NO BRIDGES


Williams
Tusayan
Bellemont
Flagstaff
COCONINO
ARIZONA
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Bitter Springs
Gray Mountain
Cameron
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Page
Tuba City
Tonalea
Segment 89U-1
Segment 89U-2
Segment 89U-3
Segment 89U-4
Segment 89U-5
Segment 89U-6
Segment 89U-7
Segment 89U-8
Segment 89U-9
Segment 89U-10
MP 420
MP 430
MP 440
MP 450
MP 460
MP 470
MP 480
MP 490
MP 500
MP 510
MP 520
MP 530
MP 540
MP 550
BNSF Railway
Black Mesa & Lake Powell Railroad
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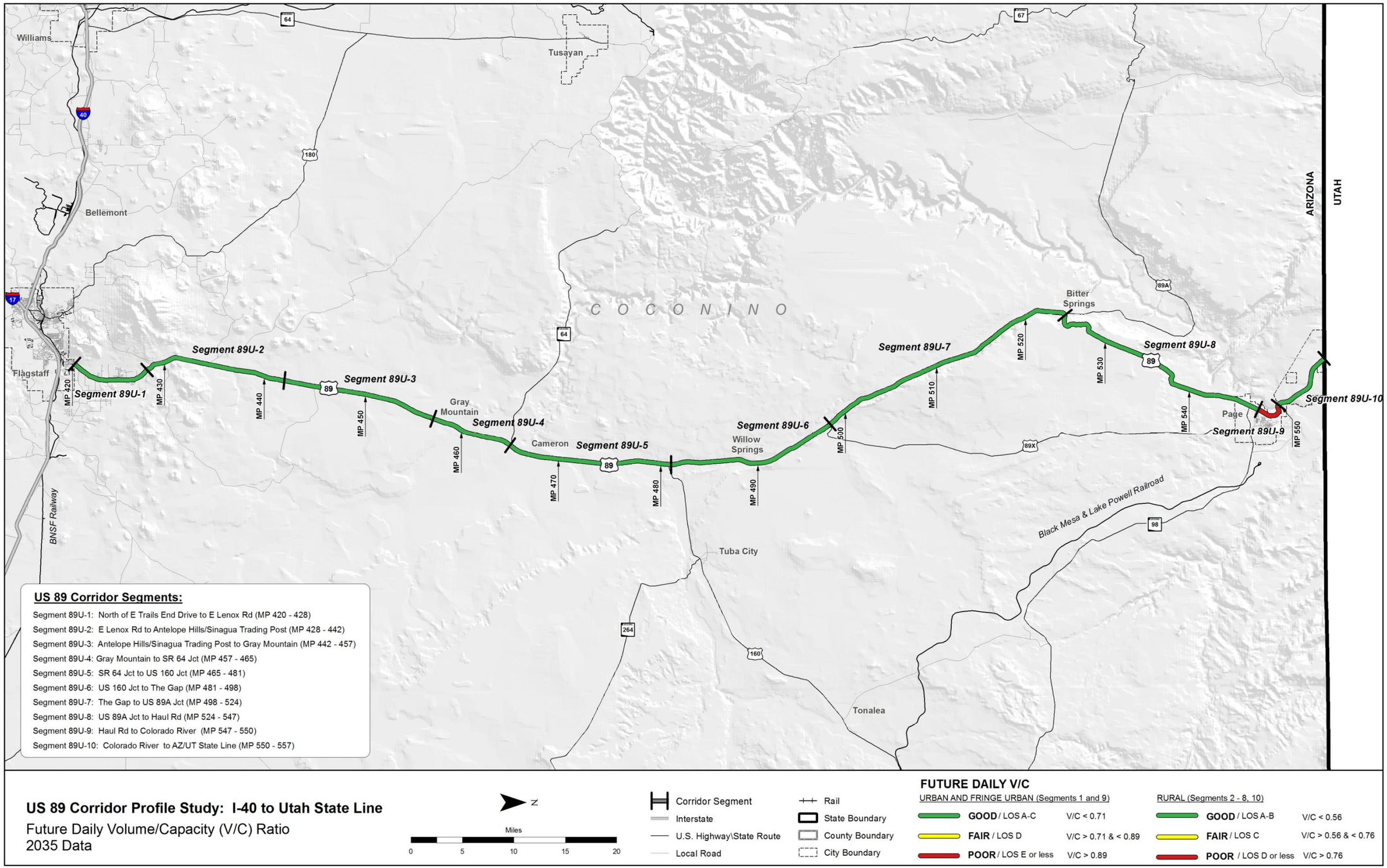
Segment 89U-9: Haul Rd to Colorado River (MP 547 - 550)
Segment 89U-10: Colorado River to AZ/UT State Line (MP 550 - 557)
US 89 Corridor Profile Study: I-40 to Utah State Line
Mobility Index
2015 and 2035 Data
N
Miles
0 5 10 15 20
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
MOBILITY INDEX
URBAN AND FRINGE URBAN (Segments 1 and 9)
GOOD / LOS A-C V/C < 0.71
FAIR / LOS D V/C > 0.71 & < 0.89
POOR / LOS E or less V/C > 0.89
RURAL (Segments 2 - 8, 10)
GOOD / LOS A-B V/C < 0.56
FAIR / LOS C V/C > 0.56 & < 0.76
POOR / LOS D or less V/C > 0.76


Williams
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Bellemont
Flagstaff
COCONINO
ARIZONA
UTAH
Bitter Springs
Gray Mountain
Cameron
Willow Springs
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Tuba City
Tonalea
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Segment 89U-1
Segment 89U-2
Segment 89U-3
Segment 89U-4
Segment 89U-5
Segment 89U-6
Segment 89U-7
Segment 89U-8
Segment 89U-9
Segment 89U-10
MP 420
MP 430
MP 440
MP 450
MP 460
MP 470
MP 480
MP 490
MP 500
MP 510
MP 520
MP 530
MP 540
MP 550
64
67
180
40
17
89
89A
89X
98
264
160
US 89 Corridor Segments:
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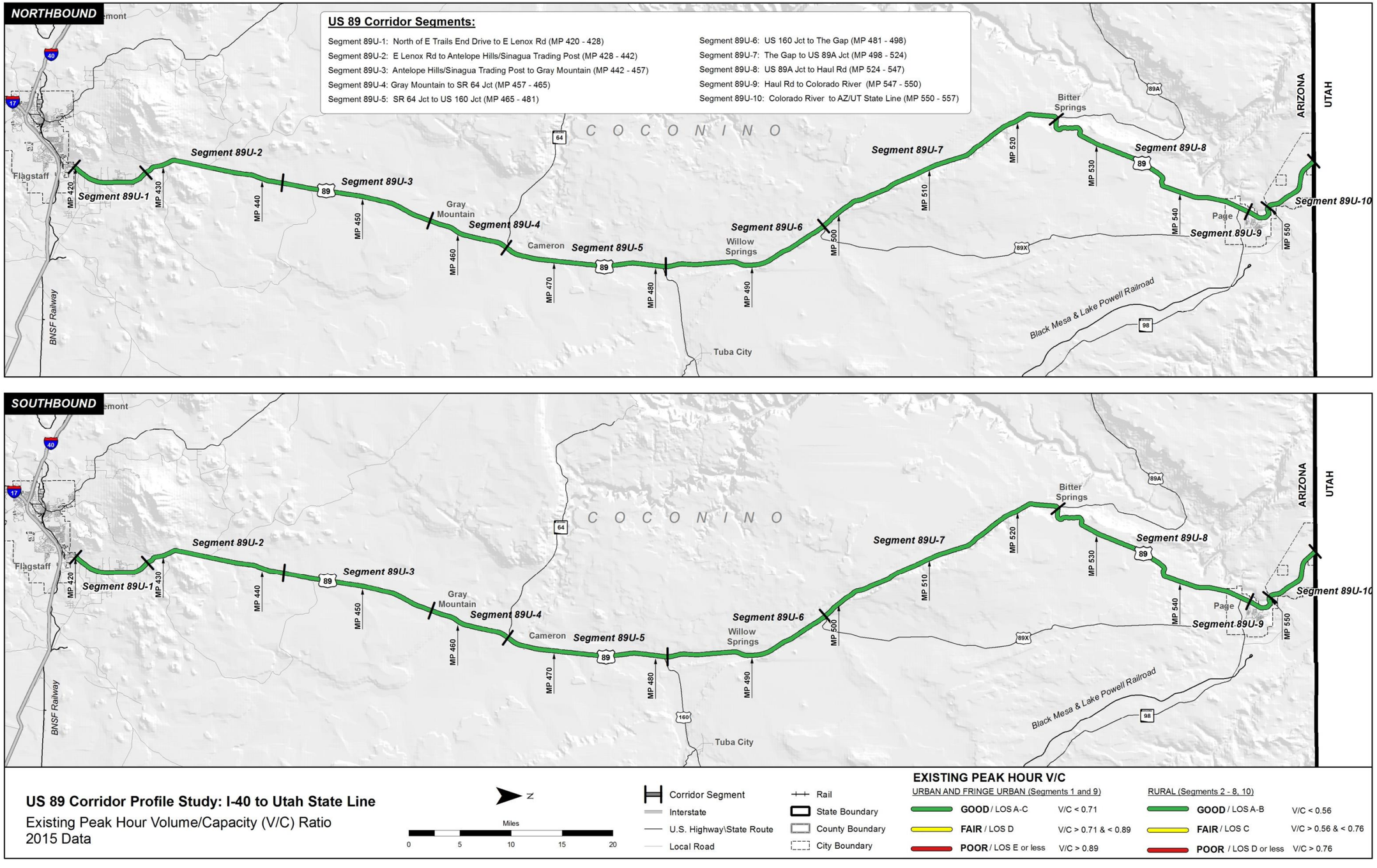
Segment 89U-10: Colorado River to AZ/UT State Line (MP 550 - 557)
US 89 Corridor Profile Study: I-40 to Utah State Line
Future Daily Volume/Capacity (V/C) Ratio
2035 Data
N
Miles
0 5 10 15 20
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
FUTURE DAILY V/C
URBAN AND FRINGE URBAN (Segments 1 and 9)
GOOD / LOS A-C V/C < 0.71
FAIR / LOS D V/C > 0.71 & < 0.89
POOR / LOS E or less V/C > 0.89
RURAL (Segments 2 - 8, 10)
GOOD / LOS A-B V/C < 0.56
FAIR / LOS C V/C > 0.56 & < 0.76
POOR / LOS D or less V/C > 0.76


NORTHBOUND
SOUTHBOUND
US 89 Corridor Segments:
Segment 89U-1: North of E Trails End Drive to E Lenox Rd (MP 420 - 428)
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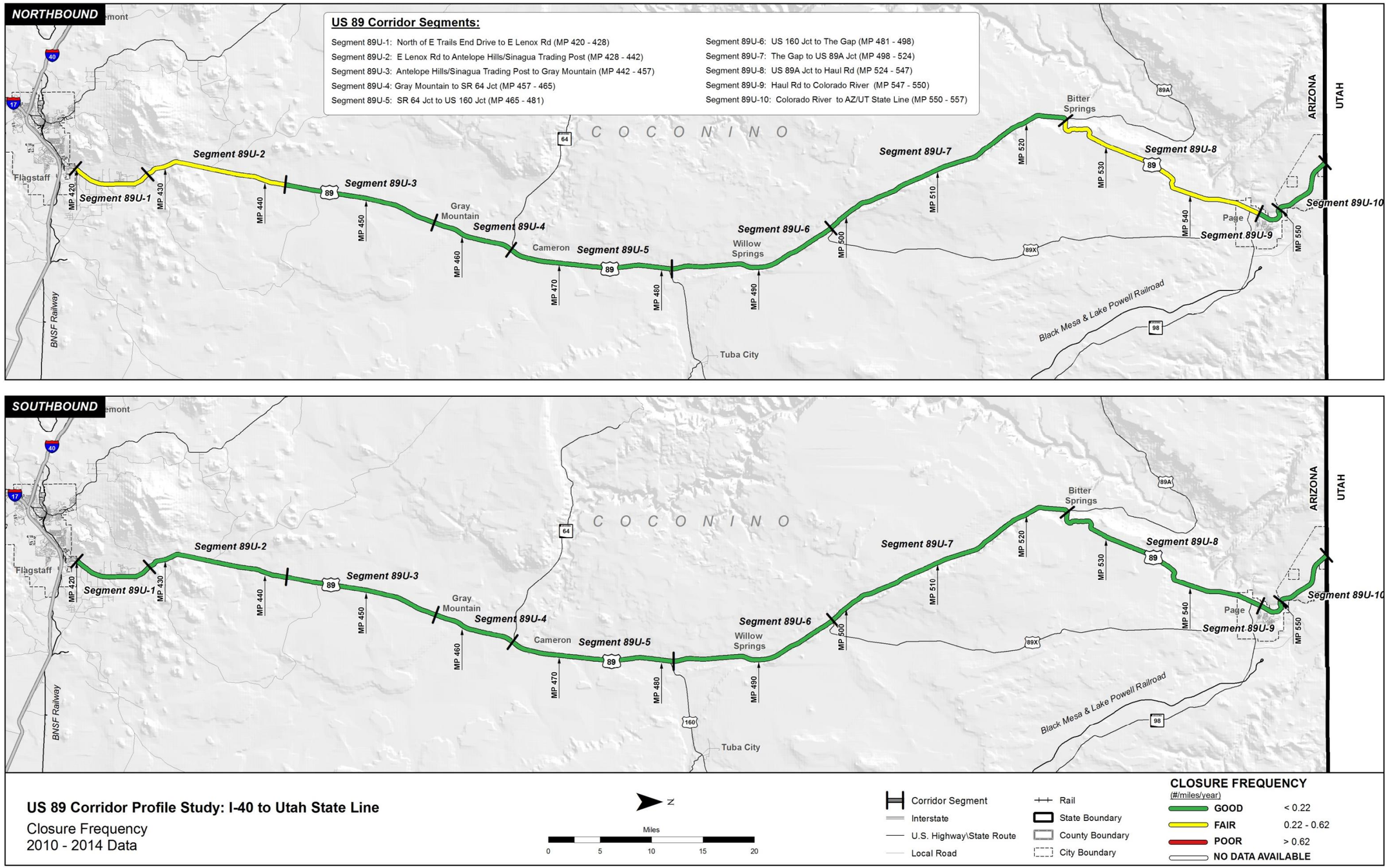
Segment 89U-10: Colorado River to AZ/UT State Line (MP 550 - 557)
COCONINO
ARIZONA
UTAH
Flagstaff
Gray Mountain
Cameron
Willow Springs
Tuba City
Bitter Springs
Page
BNSF Railway
Black Mesa & Lake Powell Railroad
Segment 89U-1
Segment 89U-2
Segment 89U-3
Segment 89U-4
Segment 89U-5
Segment 89U-6
Segment 89U-7
Segment 89U-8
Segment 89U-9
Segment 89U-10
MP 420
MP 430
MP 440
MP 450
MP 460
MP 470
MP 480
MP 490
MP 500
MP 510
MP 520
MP 530
MP 540
MP 550
40
17
64
89
89A
89X
98
160
US 89 Corridor Profile Study: I-40 to Utah State Line
Existing Peak Hour Volume/Capacity (V/C) Ratio
2015 Data
N
Miles
0 5 10 15 20
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
EXISTING PEAK HOUR V/C
URBAN AND FRINGE URBAN (Segments 1 and 9)
GOOD / LOS A-C V/C < 0.71
FAIR / LOS D V/C > 0.71 & < 0.89
POOR / LOS E or less V/C > 0.89
RURAL (Segments 2 - 8, 10)
GOOD / LOS A-B V/C < 0.56
FAIR / LOS C V/C > 0.56 & < 0.76
POOR / LOS D or less V/C > 0.76


NORTHBOUND
SOUTHBOUND
US 89 Corridor Segments:
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COCONINO
ARIZONA
UTAH
Flagstaff
Gray Mountain
Cameron
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Tuba City
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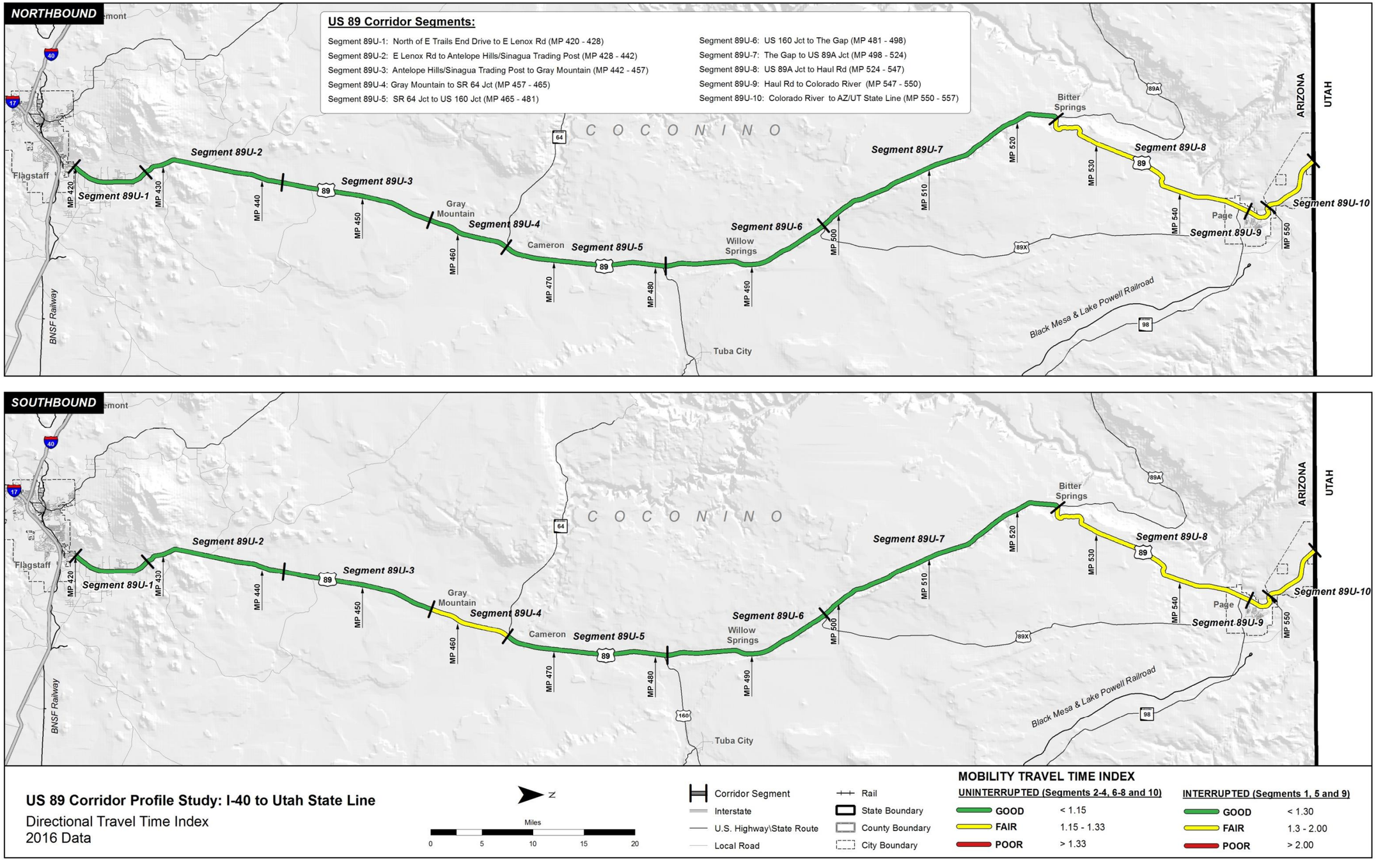
BNSF Railway
Black Mesa & Lake Powell Railroad
Segment 89U-1
Segment 89U-2
Segment 89U-3
Segment 89U-4
Segment 89U-5
Segment 89U-6
Segment 89U-7
Segment 89U-8
Segment 89U-9
Segment 89U-10
MP 420
MP 430
MP 440
MP 450
MP 460
MP 470
MP 480
MP 490
MP 500
MP 510
MP 520
MP 530
MP 540
MP 550
40
17
64
89
89A
89X
98
160
US 89 Corridor Profile Study: I-40 to Utah State Line
Closure Frequency
2010 - 2014 Data
N
Miles
0 5 10 15 20
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
CLOSURE FREQUENCY
(#/miles/year)
GOOD < 0.22
FAIR 0.22 - 0.62
POOR > 0.62
NO DATA AVAILABLE


NORTHBOUND
SOUTHBOUND
US 89 Corridor Segments:
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ARIZONA
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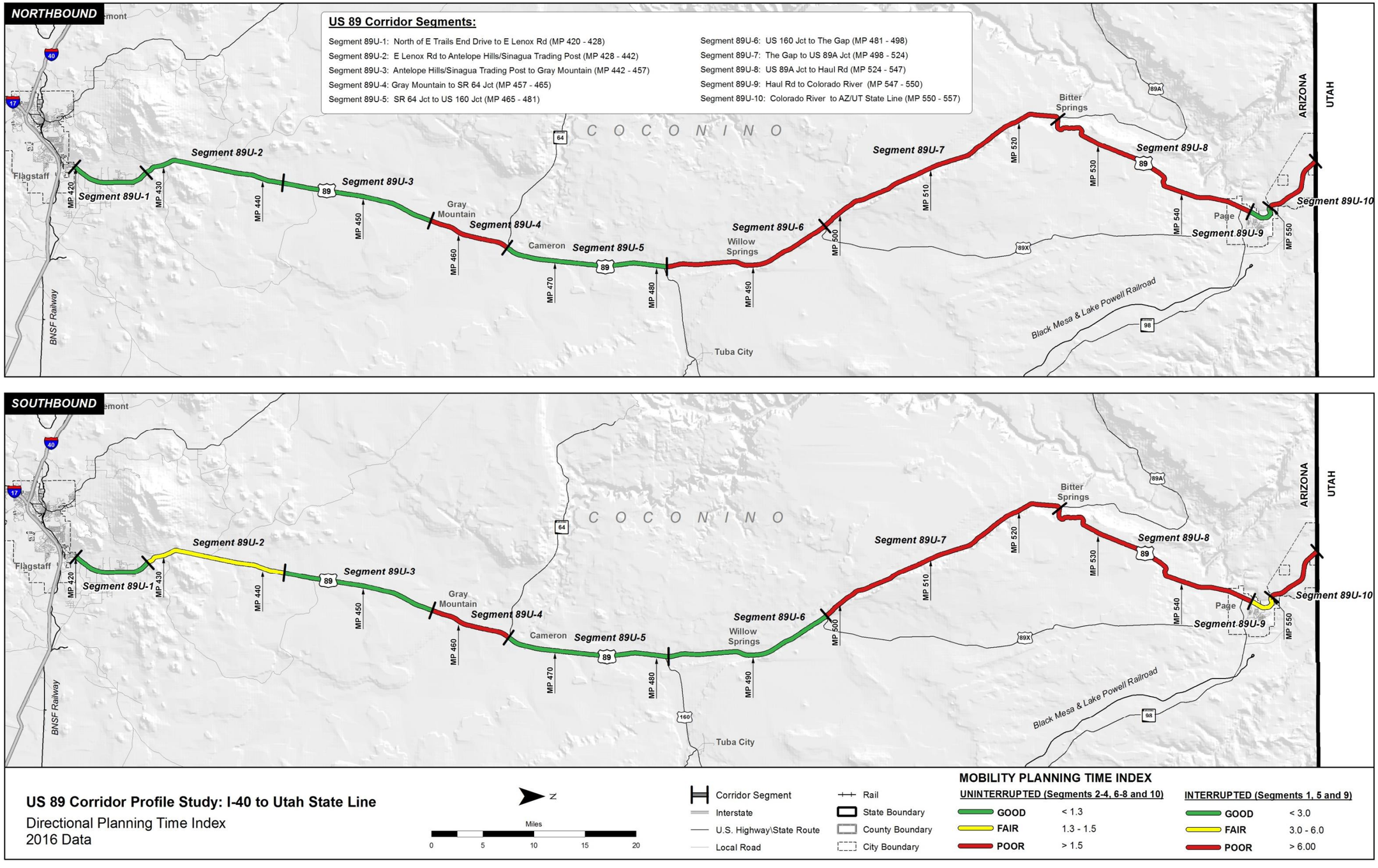
BNSF Railway
Black Mesa & Lake Powell Railroad
Segment 89U-1
Segment 89U-2
Segment 89U-3
Segment 89U-4
Segment 89U-5
Segment 89U-6
Segment 89U-7
Segment 89U-8
Segment 89U-9
Segment 89U-10
MP 420
MP 430
MP 440
MP 450
MP 460
MP 470
MP 480
MP 490
MP 500
MP 510
MP 520
MP 530
MP 540
MP 550
40
17
64
89
89A
89X
98
160
US 89 Corridor Profile Study: I-40 to Utah State Line
Directional Travel Time Index
2016 Data
N
Miles
0
5
10
15
20
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
MOBILITY TRAVEL TIME INDEX
UNINTERRUPTED (Segments 2-4, 6-8 and 10)
GOOD < 1.15
FAIR 1.15 - 1.33
POOR > 1.33
INTERRUPTED (Segments 1, 5 and 9)
GOOD < 1.30
FAIR 1.3 - 2.00
POOR > 2.00


NORTHBOUND
SOUTHBOUND
US 89 Corridor Segments:
Segment 89U-1: North of E Trails End Drive to E Lenox Rd (MP 420 - 428)
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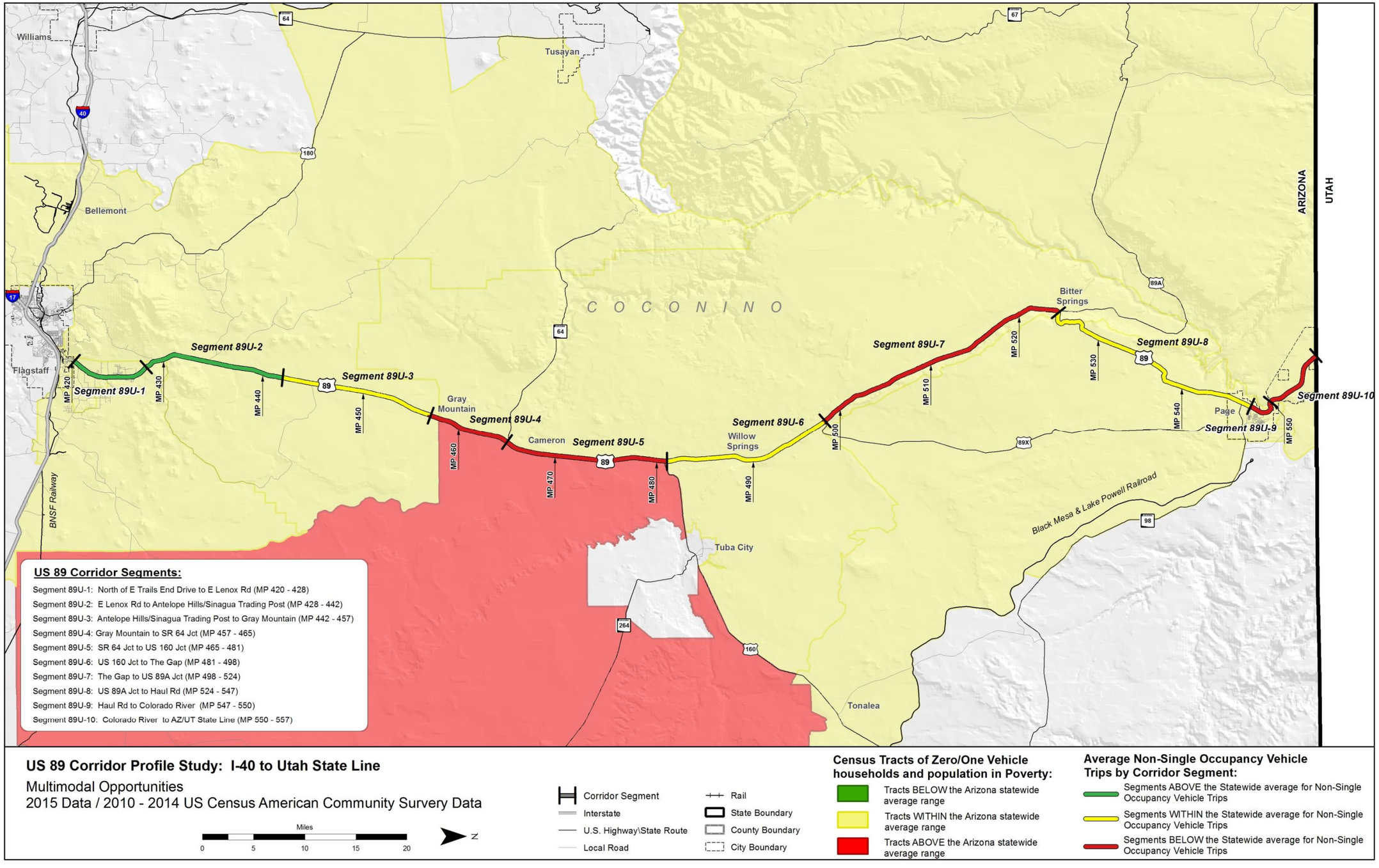
Segment 89U-9: Haul Rd to Colorado River (MP 547 - 550)
Segment 89U-10: Colorado River to AZ/UT State Line (MP 550 - 557)
COCONINO
ARIZONA
UTAH
Flagstaff
Gray Mountain
Cameron
Willow Springs
Bitter Springs
Page
Tuba City
BNSF Railway
Black Mesa & Lake Powell Railroad
MP 420
MP 430
MP 440
MP 450
MP 460
MP 470
MP 480
MP 490
MP 500
MP 510
MP 520
MP 530
MP 540
MP 550
Segment 89U-1
Segment 89U-2
Segment 89U-3
Segment 89U-4
Segment 89U-5
Segment 89U-6
Segment 89U-7
Segment 89U-8
Segment 89U-9
Segment 89U-10
40
17
64
89
89A
89X
98
160
US 89 Corridor Profile Study: I-40 to Utah State Line
Directional Planning Time Index
2016 Data
N
Miles
0
5
10
15
20
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
MOBILITY PLANNING TIME INDEX
UNINTERRUPTED (Segments 2-4, 6-8 and 10)
GOOD < 1.3
FAIR 1.3 - 1.5
POOR > 1.5
INTERRUPTED (Segments 1, 5 and 9)
GOOD < 3.0
FAIR 3.0 - 6.0
POOR > 6.00


Williams
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Bellemont
Flagstaff
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ARIZONA
UTAH
Gray Mountain
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Segment 89U-1
Segment 89U-2
Segment 89U-3
Segment 89U-4
Segment 89U-5
Segment 89U-6
Segment 89U-7
Segment 89U-8
Segment 89U-9
Segment 89U-10
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MP 430
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MP 480
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MP 540
MP 550
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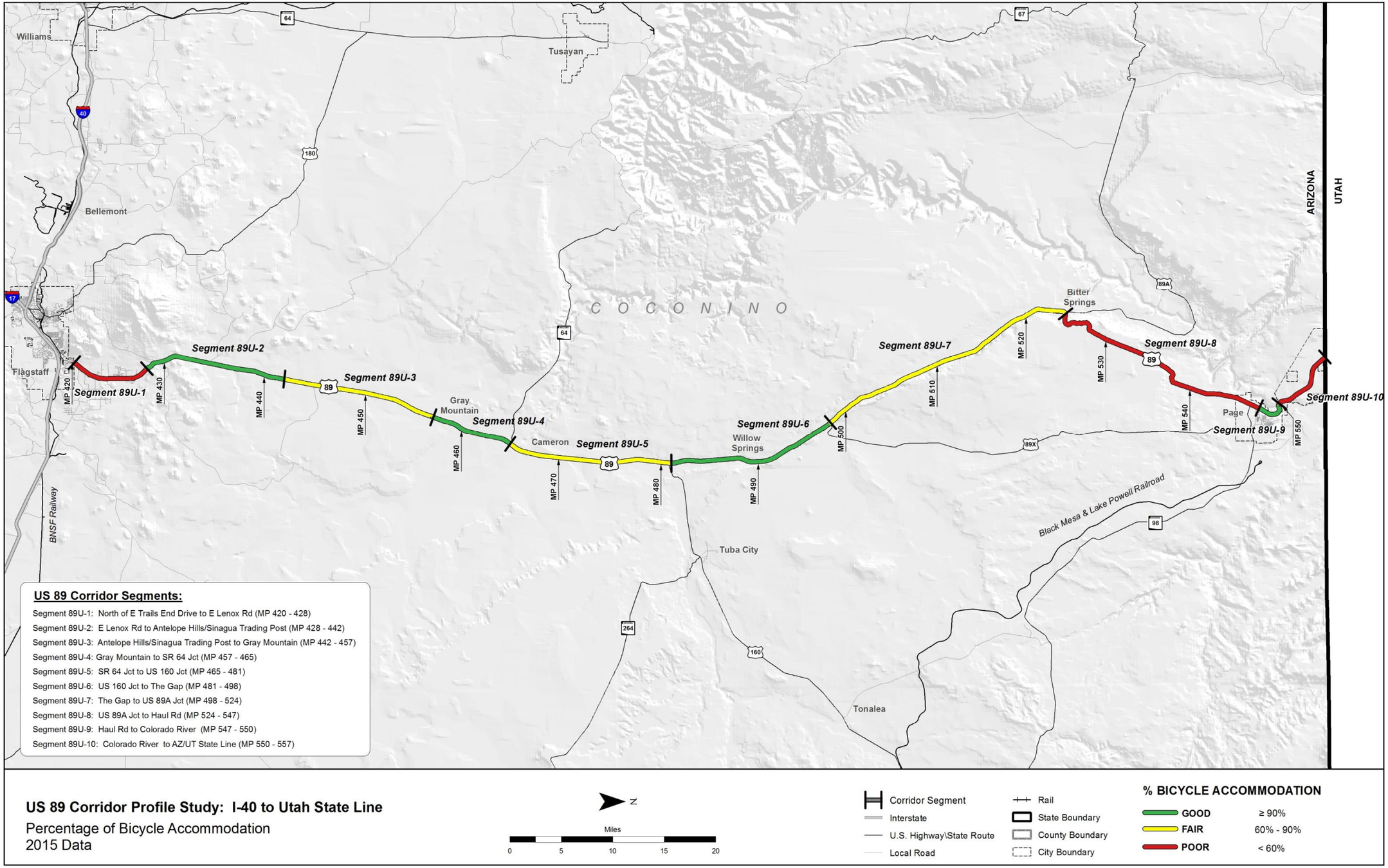
Segment 89U-10: Colorado River to AZ/UT State Line (MP 550 - 557)
US 89 Corridor Profile Study: I-40 to Utah State Line
Multimodal Opportunities
2015 Data / 2010 - 2014 US Census American Community Survery Data
Miles
0 5 10 15 20
N
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
Census Tracts of Zero/One Vehicle households and population in Poverty:
Tracts BELOW the Arizona statewide average range
Tracts WITHIN the Arizona statewide average range
Tracts ABOVE the Arizona statewide average range
Average Non-Single Occupancy Vehicle Trips by Corridor Segment:
Segments ABOVE the Statewide average for Non-Single Occupancy Vehicle Trips
Segments WITHIN the Statewide average for Non-Single Occupancy Vehicle Trips
Segments BELOW the Statewide average for Non-Single Occupancy Vehicle Trips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Segment 89U-1
Segment 89U-2
Segment 89U-3
Segment 89U-4
Segment 89U-5
Segment 89U-6
Segment 89U-7
Segment 89U-8
Segment 89U-9
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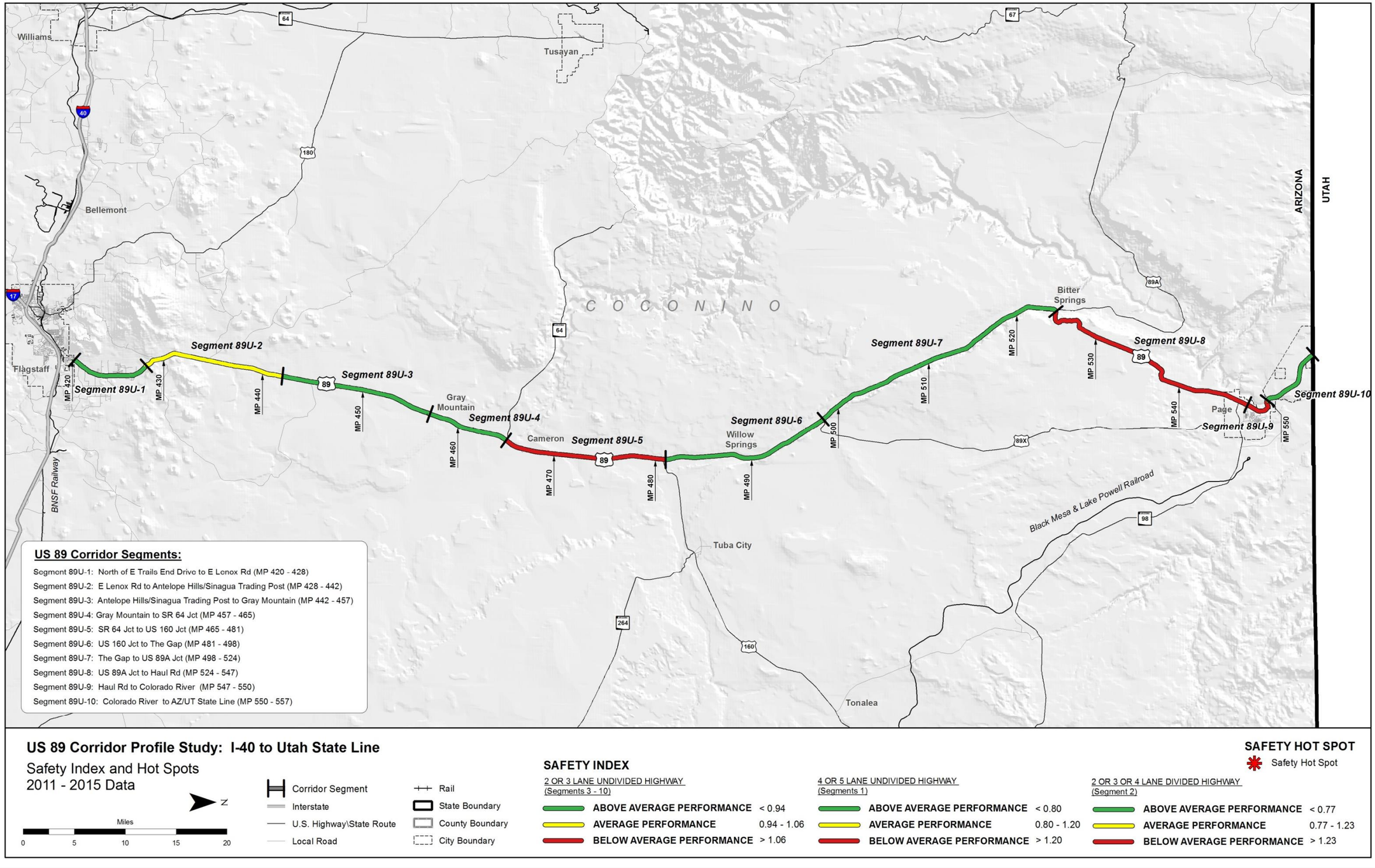
US 89 Corridor Profile Study: I-40 to Utah State Line
Percentage of Bicycle Accommodation
2015 Data
N
Miles
0 5 10 15 20
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
% BICYCLE ACCOMMODATION
GOOD ≥ 90%
FAIR 60% - 90%
POOR < 60%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Tuba City
Tonalea
Segment 89U-1
Segment 89U-2
Segment 89U-3
Segment 89U-4
Segment 89U-5
Segment 89U-6
Segment 89U-7
Segment 89U-8
Segment 89U-9
Segment 89U-10
MP 420
MP 430
MP 440
MP 450
MP 460
MP 470
MP 480
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Black Mesa & Lake Powell Railroad
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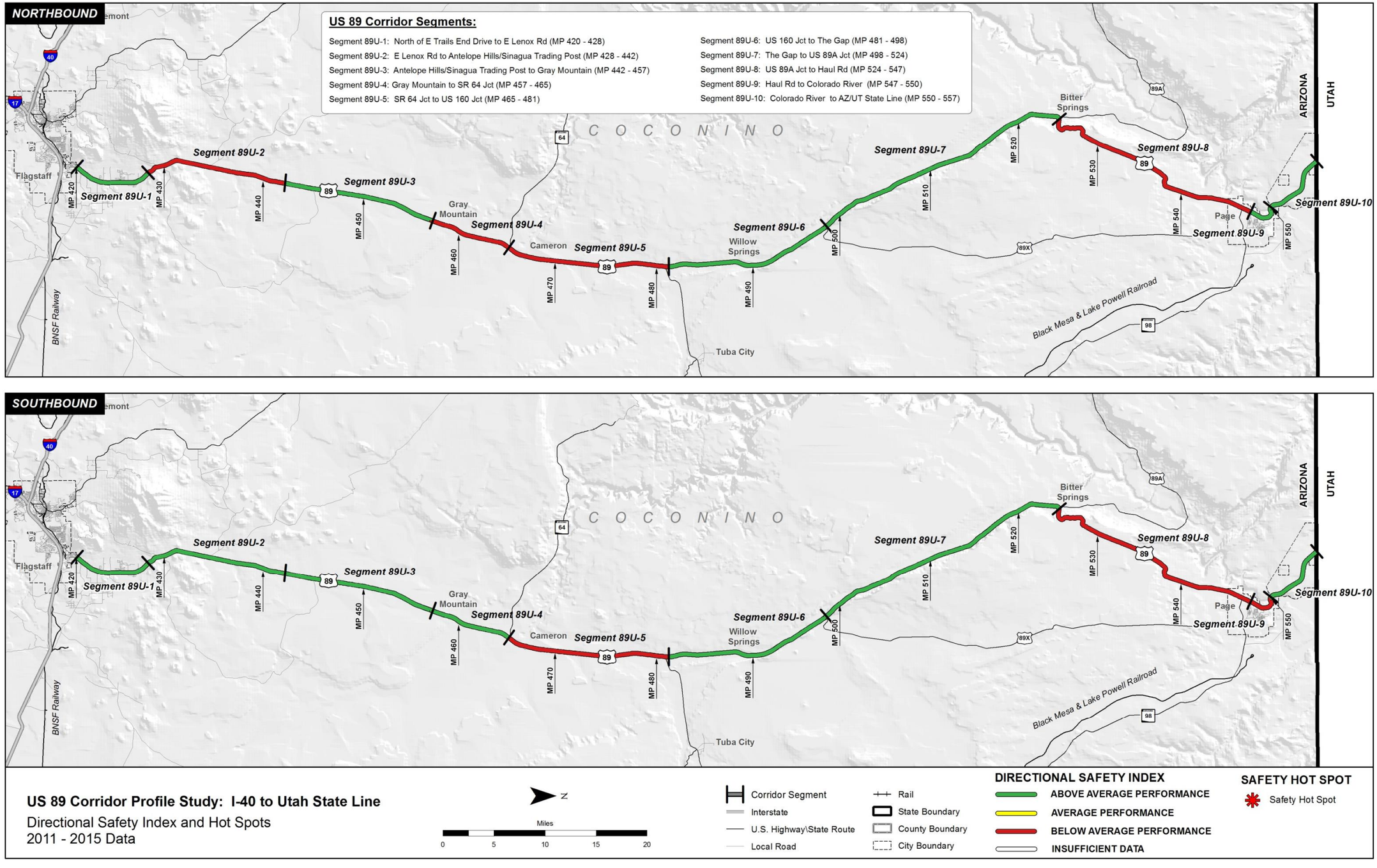
Segment 89U-10: Colorado River to AZ/UT State Line (MP 550 - 557)
US 89 Corridor Profile Study: I-40 to Utah State Line
Safety Index and Hot Spots
2011 - 2015 Data
N
Miles
0 5 10 15 20
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
SAFETY INDEX
2 OR 3 LANE UNDIVIDED HIGHWAY (Segments 3 - 10)
ABOVE AVERAGE PERFORMANCE < 0.94
AVERAGE PERFORMANCE 0.94 - 1.06
BELOW AVERAGE PERFORMANCE > 1.06
4 OR 5 LANE UNDIVIDED HIGHWAY (Segments 1)
ABOVE AVERAGE PERFORMANCE < 0.80
AVERAGE PERFORMANCE 0.80 - 1.20
BELOW AVERAGE PERFORMANCE > 1.20
2 OR 3 OR 4 LANE DIVIDED HIGHWAY (Segment 2)
ABOVE AVERAGE PERFORMANCE < 0.77
AVERAGE PERFORMANCE 0.77 - 1.23
BELOW AVERAGE PERFORMANCE > 1.23
SAFETY HOT SPOT
Safety Hot Spot


NORTHBOUND
US 89 Corridor Segments:
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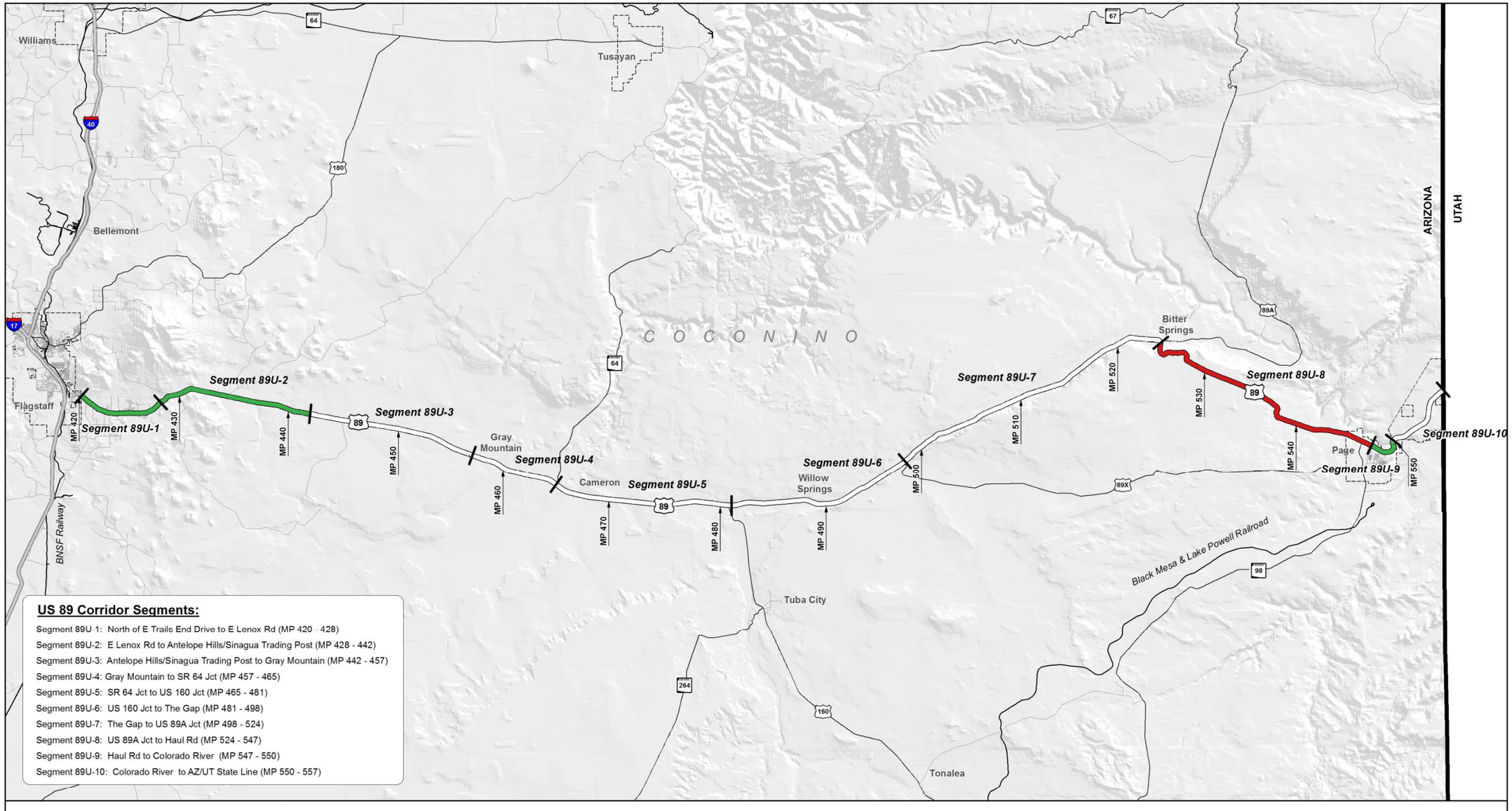
Segment 89U-7: The Gap to US 89A Jct (MP 498 - 524)
Segment 89U-8: US 89A Jct to Haul Rd (MP 524 - 547)
Segment 89U-9: Haul Rd to Colorado River (MP 547 - 550)
Segment 89U-10: Colorado River to AZ/UT State Line (MP 550 - 557)
COCONINO
Flagstaff
Gray Mountain
Cameron
Willow Springs
Bitter Springs
Page
Tuba City
BNSF Railway
Black Mesa & Lake Powell Railroad
ARIZONA
UTAH
Segment 89U-1
Segment 89U-2
Segment 89U-3
Segment 89U-4
Segment 89U-5
Segment 89U-6
Segment 89U-7
Segment 89U-8
Segment 89U-9
Segment 89U-10
MP 420
MP 430
MP 440
MP 450
MP 460
MP 470
MP 480
MP 490
MP 500
MP 510
MP 520
MP 530
MP 540
MP 550
40
17
64
89
89A
89X
98
SOUTHBOUND
US 89 Corridor Profile Study: I-40 to Utah State Line
Directional Safety Index and Hot Spots
2011 - 2015 Data
N
Miles
0
5
10
15
20
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
DIRECTIONAL SAFETY INDEX
ABOVE AVERAGE PERFORMANCE
AVERAGE PERFORMANCE
BELOW AVERAGE PERFORMANCE
INSUFFICIENT DATA
SAFETY HOT SPOT
Safety Hot Spot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Tonalea
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Segment 89U-3
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BNSF Railway
Black Mesa & Lake Powell Railroad
US 89 Corridor Segments:
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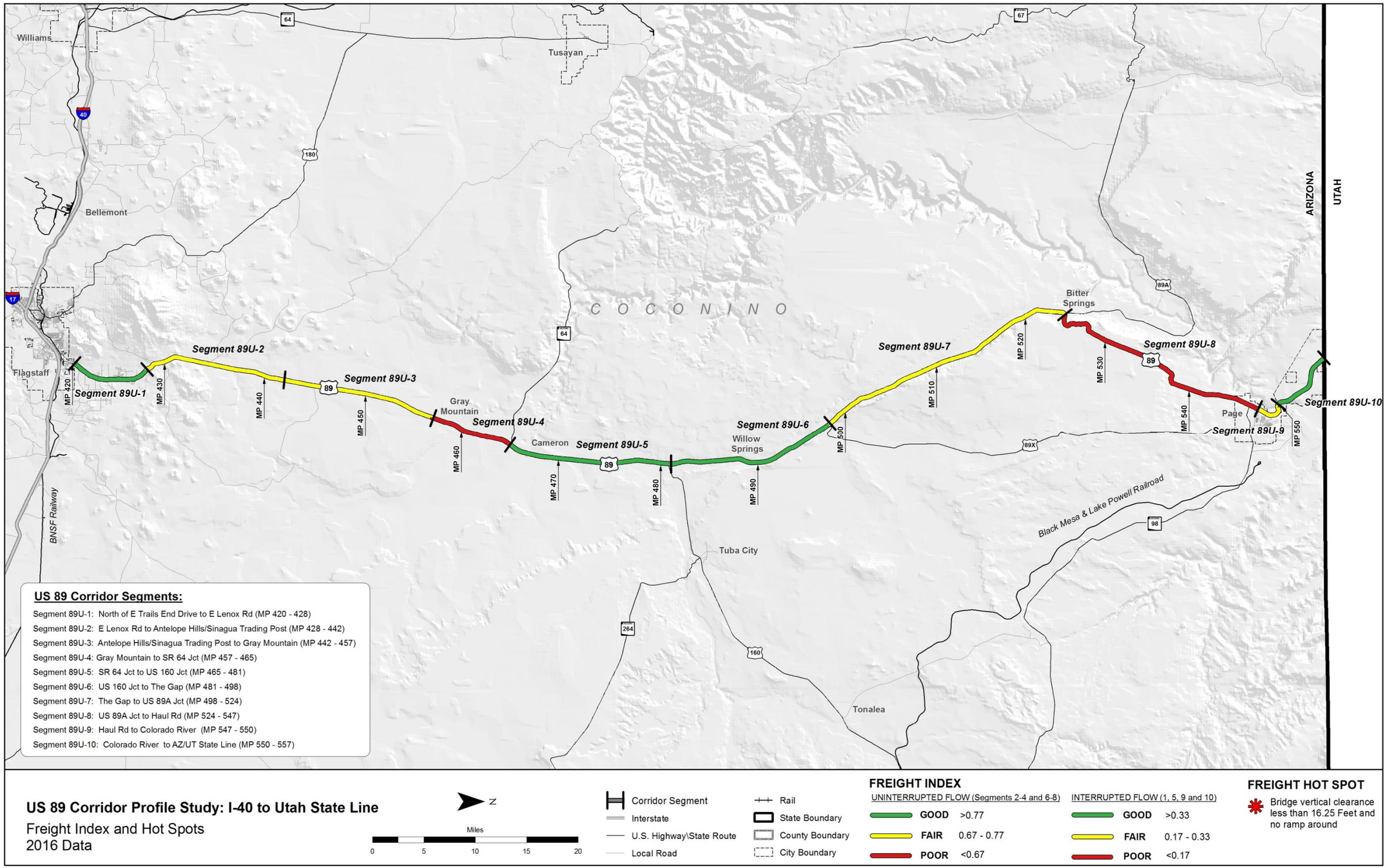
Segment 89U-9: Haul Rd to Colorado River (MP 547 - 550)
Segment 89U-10: Colorado River to AZ/UT State Line (MP 550 - 557)
US 89 Corridor Profile Study: I-40 to Utah State Line
Relative Frequency of Fatal & Incapacitating Crashes
Involving SHSP Top 5 Emphasis Areas
2011 - 2015 Data
Miles
0 5 10 15 20
N
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
CRASHES INVOLVING SHSP TOP 5 EMPHASIS AREAS
2 OR 3 LANE UNDIVIDED HIGHWAY (Segments 3 - 10)
ABOVE AVERAGE PERFORMANCE (< 51%)
AVERAGE PERFORMANCE (51% - 58%)
BELOW AVERAGE PERFORMANCE (> 58%)
INSUFFICIENT DATA
4 OR 5 LANE UNDIVIDED HIGHWAY (Segments 1)
ABOVE AVERAGE PERFORMANCE (< 42%)
AVERAGE PERFORMANCE (42% - 51%)
BELOW AVERAGE PERFORMANCE (> 51%)
INSUFFICIENT DATA
2 OR 3 OR 4 LANE DIVIDED HIGHWAY (Segment 2)
ABOVE AVERAGE PERFORMANCE (< 44%)
AVERAGE PERFORMANCE (44% - 54%)
BELOW AVERAGE PERFORMANCE (> 54%)
INSUFFICIENT DATA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Gray Mountain
Cameron
Willow Springs
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Tuba City
Tonalea
BNSF Railway
Black Mesa & Lake Powell Railroad
Segment 89U-1
Segment 89U-2
Segment 89U-3
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Segment 89U-5
Segment 89U-6
Segment 89U-7
Segment 89U-8
Segment 89U-9
Segment 89U-10
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MP 470
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MP 540
MP 550
US 89 Corridor Segments:
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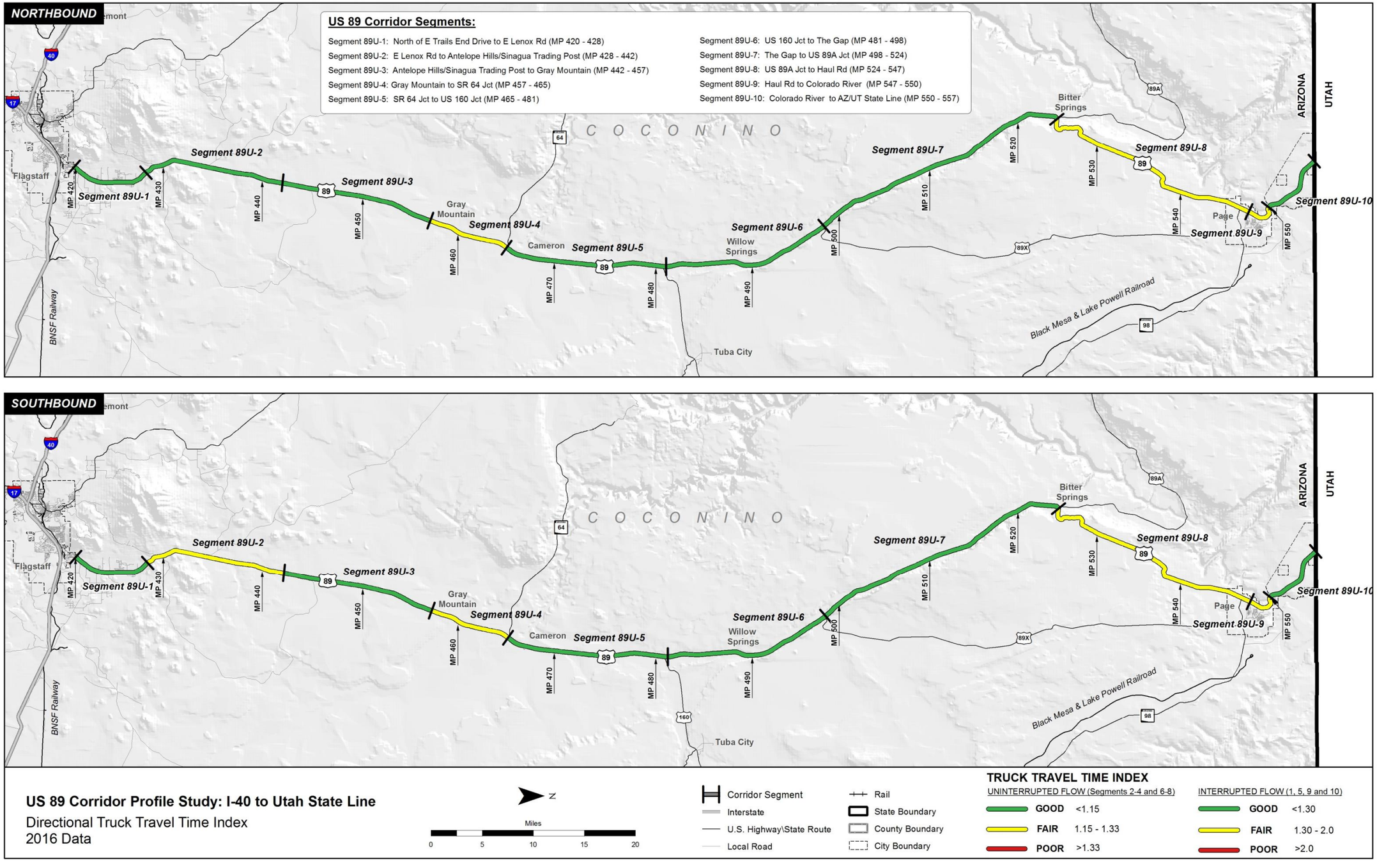
Segment 89U-9: Haul Rd to Colorado River (MP 547 - 550)
Segment 89U-10: Colorado River to AZ/UT State Line (MP 550 - 557)
US 89 Corridor Profile Study: I-40 to Utah State Line
Freight Index and Hot Spots
2016 Data
N
Miles
0 5 10 15 20
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
FREIGHT INDEX
UNINTERRUPTED FLOW (Segments 2-4 and 6-8)
GOOD >0.77
FAIR 0.67 - 0.77
POOR <0.67
INTERRUPTED FLOW (1, 5, 9 and 10)
GOOD >0.33
FAIR 0.17 - 0.33
POOR <0.17
FREIGHT HOT SPOT
Bridge vertical clearance less than 16.25 Feet and no ramp around


NORTHBOUND
SOUTHBOUND
US 89 Corridor Segments:
Segment 89U-1: North of E Trails End Drive to E Lenox Rd (MP 420 - 428)
Segment 89U-2: E Lenox Rd to Antelope Hills/Sinagua Trading Post (MP 428 - 442)
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ARIZONA
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Flagstaff
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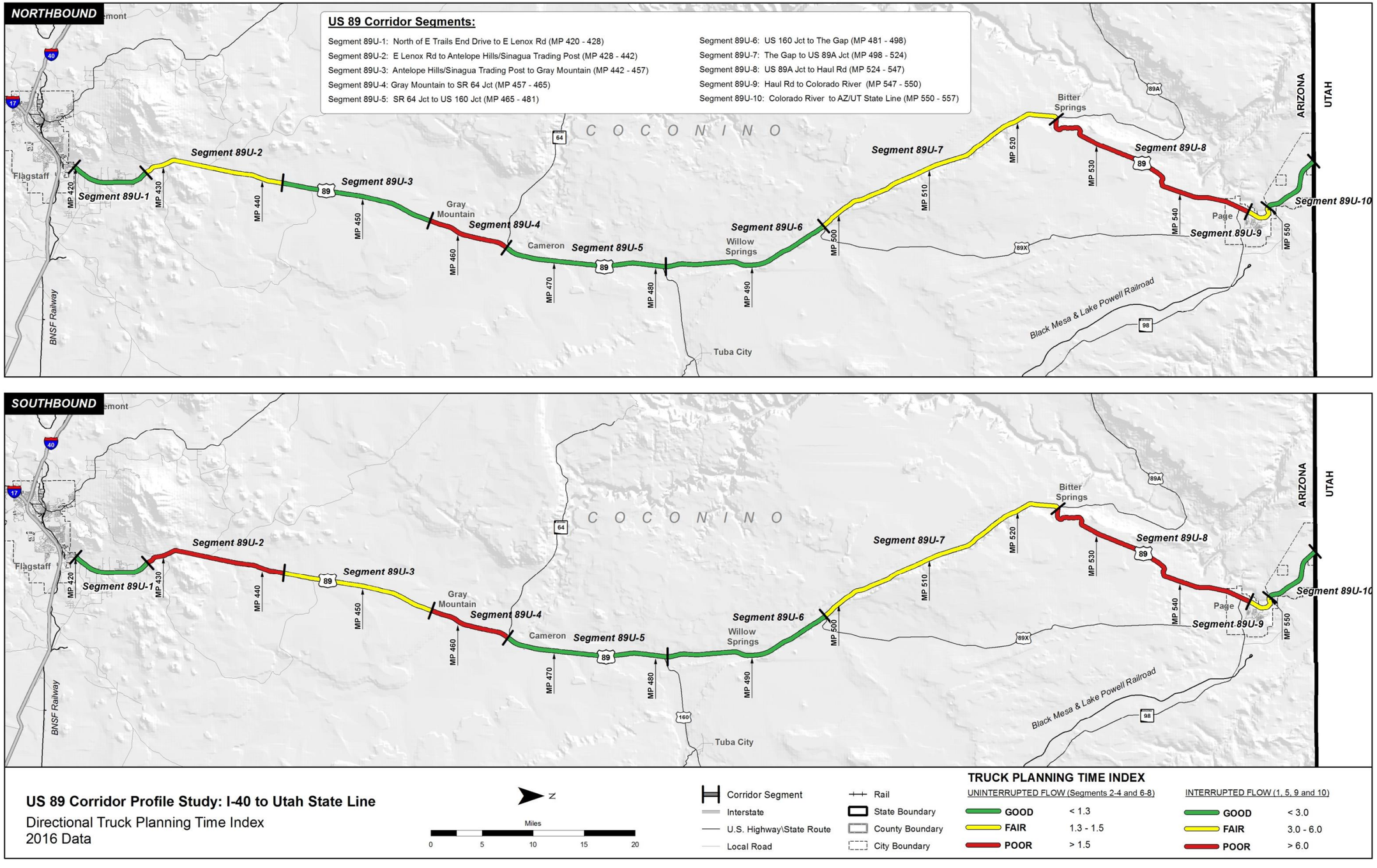
Cameron
Willow Springs
Tuba City
Bitter Springs
Page
BNSF Railway
Black Mesa & Lake Powell Railroad
Segment 89U-1
Segment 89U-2
Segment 89U-3
Segment 89U-4
Segment 89U-5
Segment 89U-6
Segment 89U-7
Segment 89U-8
Segment 89U-9
Segment 89U-10
MP 420
MP 430
MP 440
MP 450
MP 460
MP 470
MP 480
MP 490
MP 500
MP 510
MP 520
MP 530
MP 540
MP 550
40
17
64
89
89A
89X
98
160
US 89 Corridor Profile Study: I-40 to Utah State Line
Directional Truck Travel Time Index
2016 Data
N
Miles
0 5 10 15 20
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
TRUCK TRAVEL TIME INDEX
UNINTERRUPTED FLOW (Segments 2-4 and 6-8)
GOOD <1.15
FAIR 1.15 - 1.33
POOR >1.33
INTERRUPTED FLOW (1, 5, 9 and 10)
GOOD <1.30
FAIR 1.30 - 2.0
POOR >2.0


NORTHBOUND
SOUTHBOUND
US 89 Corridor Segments:
Segment 89U-1: North of E Trails End Drive to E Lenox Rd (MP 420 - 428)
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BNSF Railway
Black Mesa & Lake Powell Railroad
MP 420
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MP 450
MP 460
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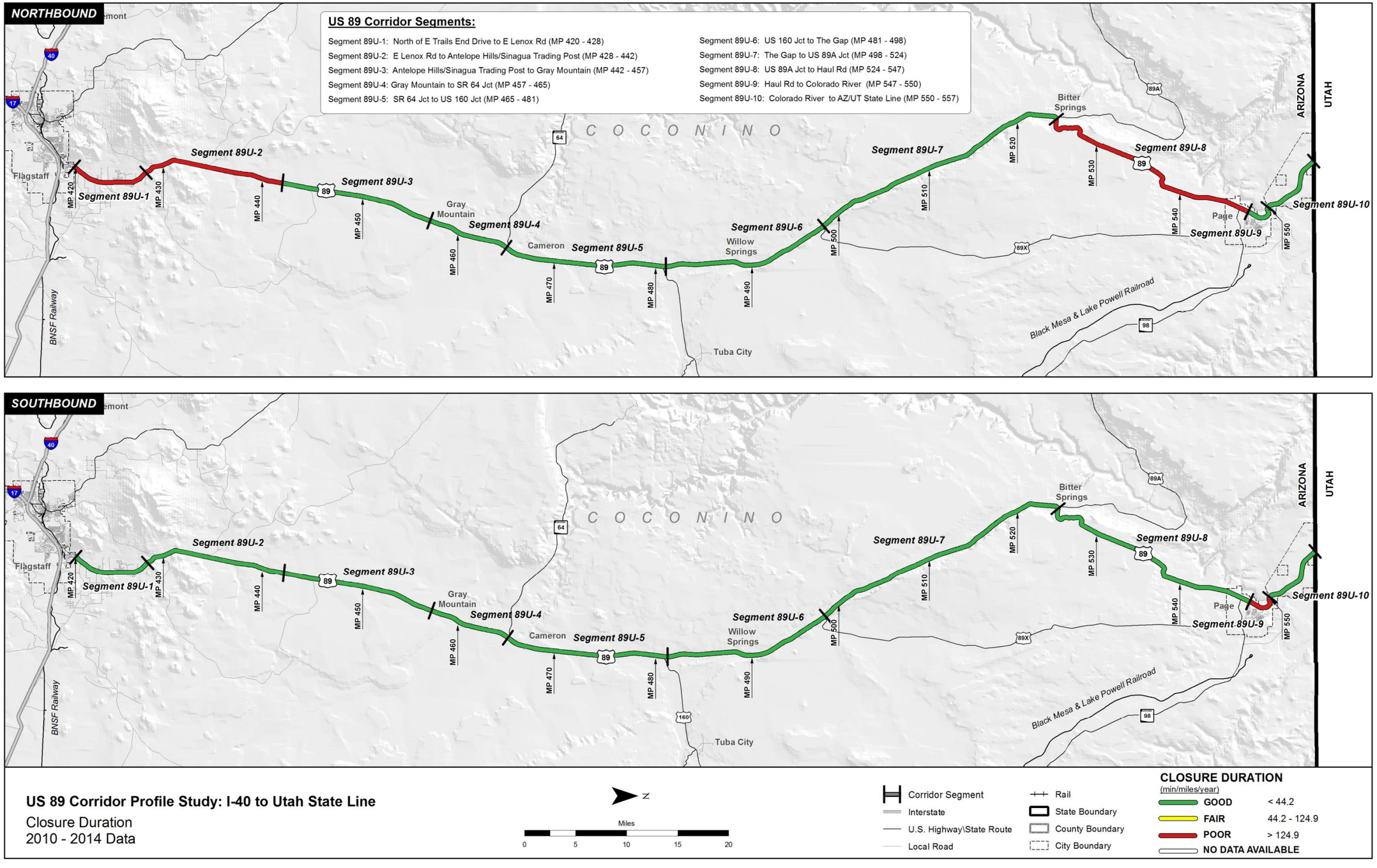
MP 530
MP 540
MP 550
Segment 89U-1
Segment 89U-2
Segment 89U-3
Segment 89U-4
Segment 89U-5
Segment 89U-6
Segment 89U-7
Segment 89U-8
Segment 89U-9
Segment 89U-10
US 89 Corridor Profile Study: I-40 to Utah State Line
Directional Truck Planning Time Index
2016 Data
N
Miles
0 5 10 15 20
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
TRUCK PLANNING TIME INDEX
UNINTERRUPTED FLOW (Segments 2-4 and 6-8)
GOOD < 1.3
FAIR 1.3 - 1.5
POOR > 1.5
INTERRUPTED FLOW (1, 5, 9 and 10)
GOOD < 3.0
FAIR 3.0 - 6.0
POOR > 6.0


NORTHBOUND
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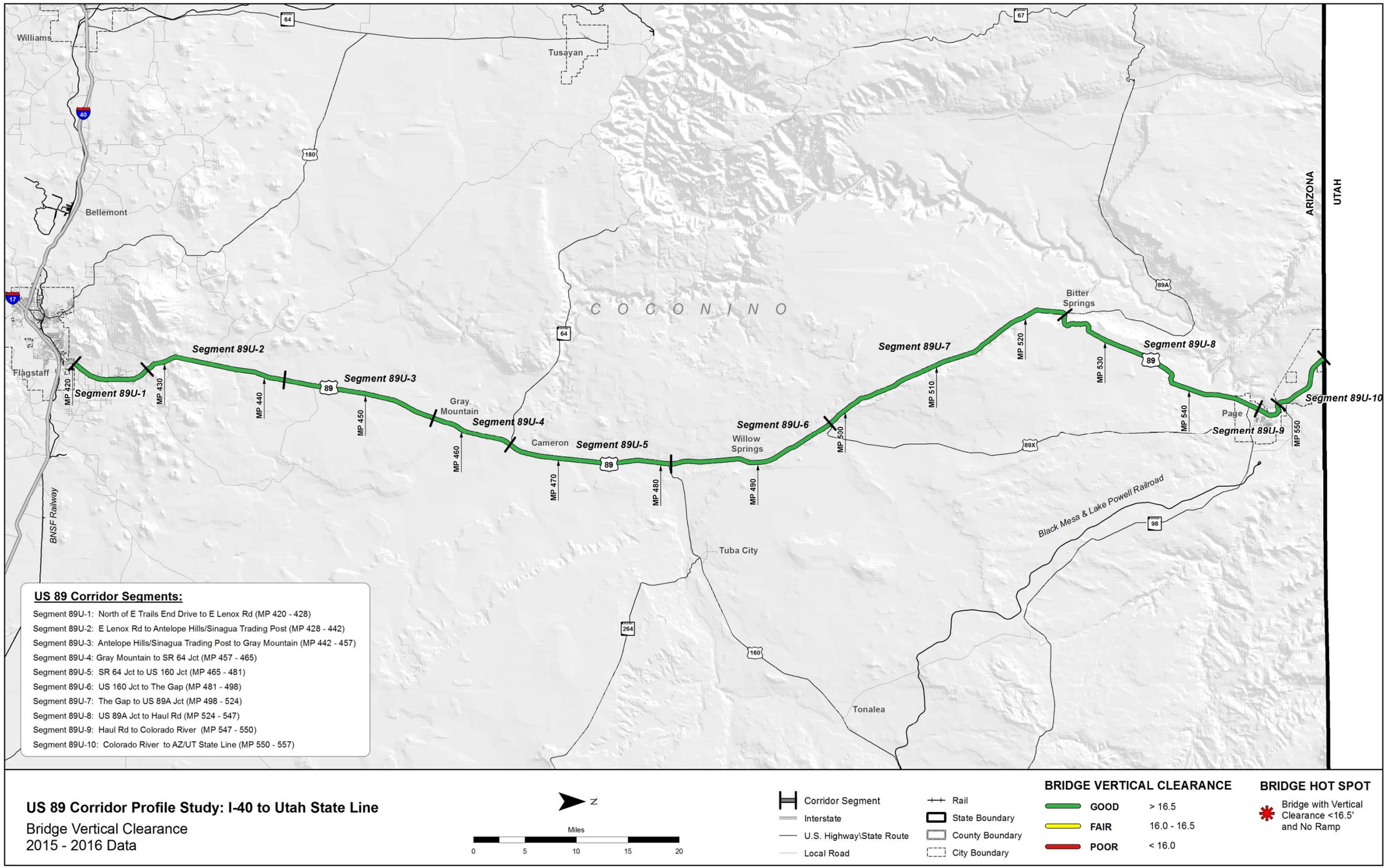
MP 530
MP 540
MP 550
BNSF Railway
Black Mesa & Lake Powell Railroad
SOUTHBOUND
US 89 Corridor Profile Study: I-40 to Utah State Line
Closure Duration
2010 - 2014 Data
Miles
0 5 10 15 20
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
CLOSURE DURATION
(min/miles/year)
GOOD < 44.2
FAIR 44.2 - 124.9
POOR > 124.9
NO DATA AVAILABLE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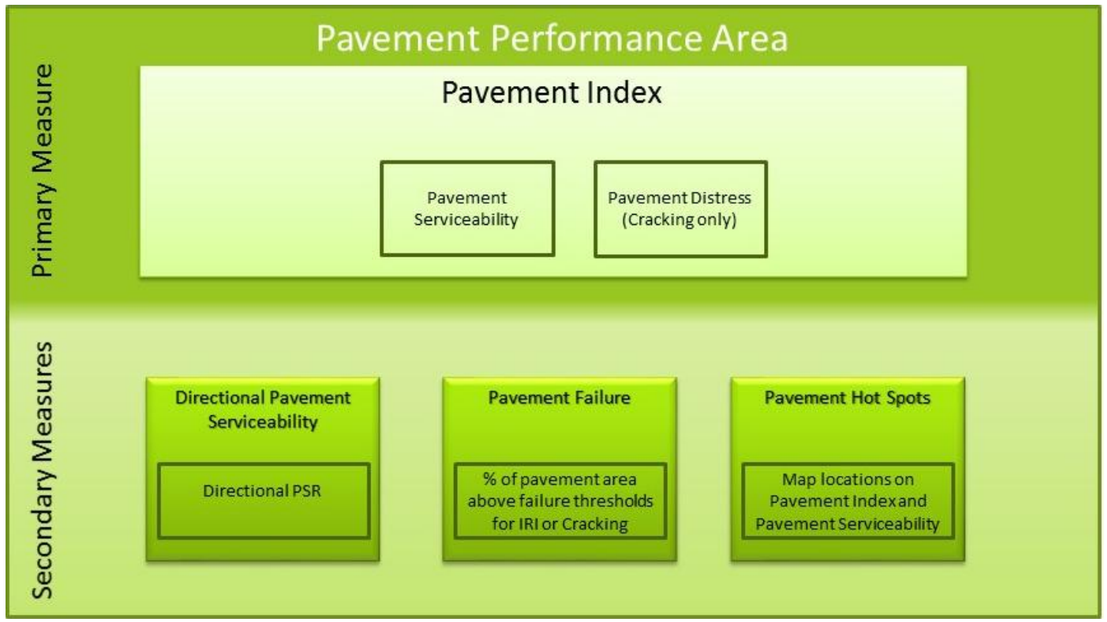
Segment 89U-10: Colorado River to AZ/UT State Line (MP 550 - 557)
US 89 Corridor Profile Study: I-40 to Utah State Line
Bridge Vertical Clearance
2015 - 2016 Data
N
Miles
0 5 10 15 20
Corridor Segment
Interstate
U.S. Highway\State Route
Local Road
Rail
State Boundary
County Boundary
City Boundary
BRIDGE VERTICAL CLEARANCE
GOOD > 16.5
FAIR 16.0 - 16.5
POOR < 16.0
BRIDGE HOT SPOT
Bridge with Vertical Clearance <16.5' and No Ramp

Appendix B: Performance Area Detailed Calculation Methodologies

Pavement Performance Area Calculation Methodologies

This section summarizes the approach for developing the primary and secondary performance measures in the Pavement performance area as shown in the following graphic:



This performance area is used to evaluate mainline pavement condition. Pavement condition data for ramps, frontage roads, crossroads, etc. was not included in the evaluation.

Primary Pavement Index

The Pavement Index is calculated based on the use of two pavement condition ratings from the ADOT Pavement Database. The two ratings are the International Roughness Index (IRI) and the Cracking rating. The calculation of the Pavement Index uses a combination these two ratings.

The IRI is a measurement of the pavement roughness based on field-measured longitudinal roadway profiles. To facilitate the calculation of the index, the IRI rating was converted to a Pavement Serviceability Rating (PSR) using the following equation:

$$PSR = 5 * e^{-0.0038 * IRI}$$

The Cracking Rating is a measurement of the amount of surface cracking based on a field-measured area of 1,000 square feet that serves as a sample for each mile. To facilitate the calculation of the index, the Cracking Rating was converted to a Pavement Distress Index (PDI) using the following equation:

$$PDI = 5 - (0.345 * C^{0.66})$$

Both the PSR and PDI use a 0 to 5 scale with 0 representing the lowest performance and 5 representing the highest performance. The performance thresholds for interstates and non-interstates shown in the tables below were used for the PSR and PDI.

Performance Level for Interstates	IRI (PSR)	Cracking (PDI)
Good	<75 (>3.75)	<7 (>3.75)
Fair	75 - 117 (3.20 - 3.75)	7 - 12 (3.22 - 3.75)
Poor	>117 (<3.20)	>12 (<3.22)

Performance Level for Non-Interstates	IRI (PSR)	Cracking (PDI)
Good	<94 (>3.5)	<9 (>3.5)
Fair	94 - 142 (2.9 - 3.5)	9 - 15 (2.9 - 3.5)
Poor	>142 (<2.9)	>15 (<2.9)

The PSR and PDI are calculated for each 1-mile section of roadway. If PSR or PDI falls into a poor rating (<3.2 for interstates, for example) for a 1-mile section, then the score for that 1-mile section is entirely (100%) based on the lower score (either PSR or PDI). If neither PSR or PDI fall into a poor rating for a 1-mile section, then the score for that 1-mile section is based on a combination of the lower rating (70% weight) and the higher rating (30% weight). The result is a score between 0 and 5 for each direction of travel of each mile of roadway based on a combination of both the PSR and the PDI.

The project corridor has been divided into segments. The Pavement Index for each segment is a weighted average of the directional ratings based on the number of travel lanes. Therefore, the condition of a section with more travel lanes will have a greater influence on the resulting segment Pavement Index than a section with fewer travel lanes.

Secondary Pavement Measures

Three secondary measures are evaluated:

- Directional Pavement Serviceability
- Pavement Failure
- Pavement Hot Spots

Directional Pavement Serviceability: Similar to the Pavement Index, the Directional Pavement Serviceability is calculated as a weighted average (based on number of lanes) for each segment. However, this rating only utilizes the PSR and is calculated separately for each direction of travel. The PSR uses a 0 to 5 scale with 0 representing the lowest performance and 5 representing the highest performance.

Pavement Failure: The percentage of pavement area rated above the failure thresholds for IRI or Cracking is calculated for each segment. In addition, the Standard score (z-score) is calculated for each segment.

The Standard score (z-score) is the number of standard deviations above or below the mean. Therefore, a Standard score between -0.5 and +0.5 is "average", less than -0.5 is lower (better) than average, and higher than +0.5 is above (worse) than average.

Pavement Hot Spots: The Pavement Index map identifies locations that have an IRI rating or Cracking rating that fall above the failure threshold as identified by ADOT Pavement Group. For interstates, an IRI rating above 105 or a Cracking rating above 15 will be used as the thresholds which are slightly different than the ratings shown previously. For non-interstates, an IRI rating above 142 or a Cracking rating above 15 will be used as the thresholds.

Scoring

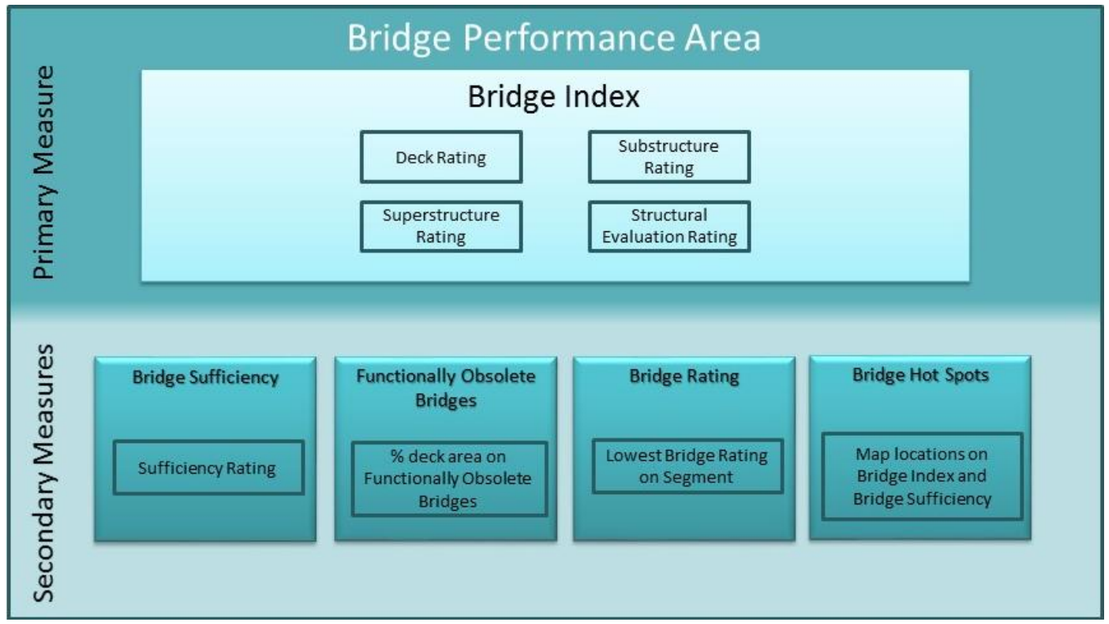
Performance Level	Pavement Index	
	Interstates	Non-Interstates
Good	>3.75	>3.5
Fair	3.2 - 3.75	2.9 - 3.5
Poor	<3.2	<2.9

Performance Level	Directional Pavement Serviceability	
	Interstates	Non-Interstates
Good	>3.75	>3.5
Fair	3.2 - 3.75	2.9 - 3.5
Poor	<3.2	<2.9

Performance Level	% Pavement Failure
Good	< 5%
Fair	5% – 20%
Poor	>20%

Bridge Performance Area Calculation Methodologies

This section summarizes the approach for developing the primary and secondary performance measures in the Bridge performance area as shown in the following graphic:



This performance area is used to evaluate mainline bridges. Bridges on ramps (that do not cross the mainline), frontage roads, etc. should not be included in the evaluation. Basically, any bridge that carries mainline traffic or carries traffic over the mainline should be included and bridges that do not carry mainline traffic, run parallel to the mainline (frontage roads), or do not cross the mainline should not be included.

Primary Bridge Index

The Bridge Index is calculated based on the use of four bridge condition ratings from the ADOT Bridge Database, also known as the Arizona Bridge Information and Storage System (ABISS). The four ratings are the Deck Rating, Substructure Rating, Superstructure Rating, and Structural Evaluation Rating. The calculation of the Bridge Index uses the lowest of these four ratings.

Each of the four condition ratings use a 0 to 9 scale with 0 representing the lowest performance and 9 representing the highest performance.

The project corridor has been divided into segments and the bridges are grouped together according to the segment definitions. In order to report the Bridge Index for each corridor segment, the Bridge Index for each segment is a weighted average based on the deck area for each bridge. Therefore, the condition of a larger bridge will have a greater influence on the resulting segment Bridge Index than a smaller bridge.

Secondary Bridge Measures

Four secondary measures will be evaluated:

- Bridge Sufficiency
- Functionally Obsolete Bridges
- Bridge Rating
- Bridge Hot Spots

Bridge Sufficiency: Similar to the Bridge Index, the Bridge Sufficiency rating is calculated as a weighted average (based on deck area) for each segment. The Bridge Sufficiency rating is a scale of 0 to 100 with 0 representing the lowest performance and 100 representing the highest performance. A rating of 80 or above represents “good” performance, a rating between 50 and 80 represents “fair” performance, and a rating below 50 represents “poor” performance.

Functionally Obsolete Bridges: The percentage of total deck area in a segment that is on functionally obsolete bridges is calculated for each segment. The deck area for each bridge within each segment that has been identified as functionally obsolete is totaled and divided by the total deck area for the segment to calculate the percentage of deck area on functionally obsolete bridges for each segment.

The thresholds for this performance measure are determined based on the Standard score (z-score). The Standard score (z-score) is the number of standard deviations above or below the mean. Therefore, a Standard score between -0.5 and +0.5 is “average”, less than -0.5 is lower (better) than average, and higher than +0.5 is above (worse) average.

Bridge Rating: The Bridge Rating simply identifies the lowest bridge rating on each segment. This performance measure is not an average and therefore is not weighted based on the deck area. The Bridge Index identifies the lowest rating for each bridge, as described above. Each of the four condition ratings use a 0 to 9 scale with 0 representing the lowest performance and 9 representing the highest performance.

Bridge Hot Spots: The Bridge Index map identifies individual bridge locations that are identified as hot spots. Hot spots are bridges that have a single rating of 4 in any of the four ratings, or multiple ratings of 5 in the deck, substructure or superstructure ratings.

Scoring:

Performance Level	Bridge Index
Good	>6.5
Fair	5.0-6.5
Poor	<5.0

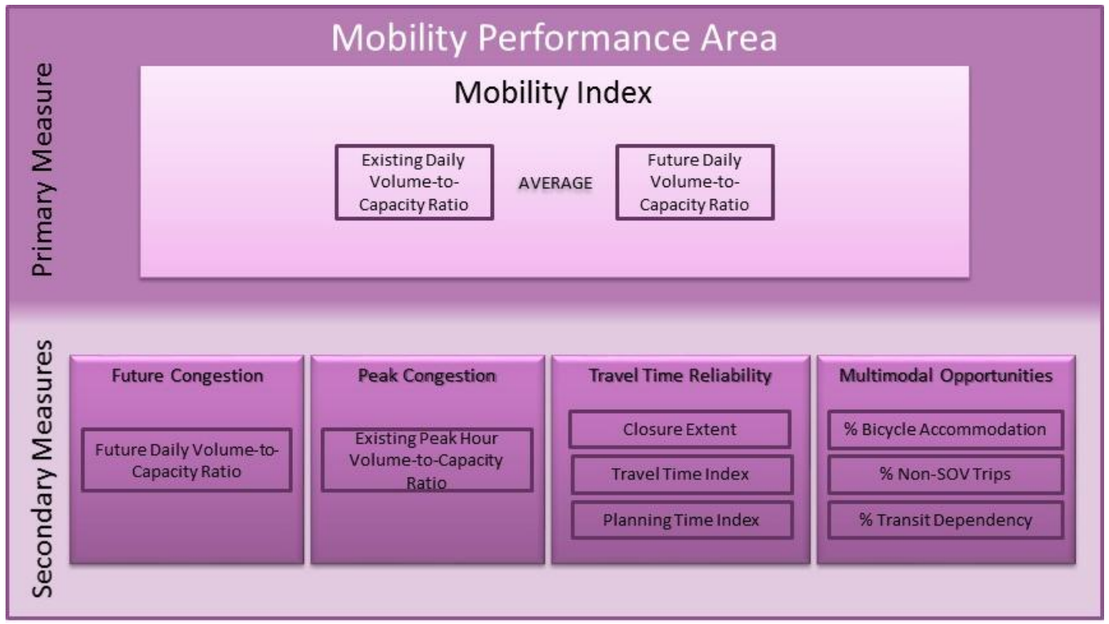
Performance Level	Sufficiency Rating
Good	>80
Fair	50-80
Poor	<50

Performance Level	Bridge Rating
Good	>6
Fair	5-6
Poor	<5

Performance Level	% Functionally Obsolete
Good	< 12%
Fair	12%-40%
Poor	>40%

Mobility Performance Area Calculation Methodologies

This section summarizes the approach for developing the primary and secondary performance measures in the Mobility performance area as shown in the following graphic:



Primary Mobility Index

The primary Mobility Index is an average of the existing daily volume-to-capacity (V/C) ratio and the future daily V/C ratio for each segment of the corridor.

Existing Daily V/C: The existing daily V/C ratio for each segment is calculated by dividing the 2014 Annual Average Daily Traffic (AADT) volume for each segment by the total Level of Service (LOS) E capacity volume for that segment

The capacity is calculated using the HERS Procedures for Estimating Highway Capacity[1]. The HERS procedure incorporates HCM 2010 methodologies. The methodology includes capacity estimation procedures for multiple facility types including freeways, rural two-lane highways, multilane highways, and signalized and non-signalized urban sections.

The segment capacity is defined as a function of the number of mainline lanes, shoulder width, interrupted or uninterrupted flow facilities, terrain type, percent of truck traffic, and the designated urban or rural environment.

[1] HERS Support – 2011, Task 6: Procedures for Estimating Highway Capacity, draft Technical Memorandum. Cambridge Systematics. Prepared for the Federal Highway Administration. March 2013.

The AADT for each segment is calculated by applying a weighted average across the length of the segment based on the individual 24-hour volumes and distances associated with each HPMS count station within each segment.

The following example equation is used to determine the weighted average of a segment with two HPMS count locations within the corridor

((HPMS 1 Distance x HPMS 1 Volume) + (HPMS 2 Distance x HPMS 2 Volume))/Total Segment Length

For specific details regarding the HERS methodology used, refer to the *Procedures for Estimating Highway Capacity, draft Technical Memorandum.*

Future Daily V/C: The future daily V/C ratio for each segment is calculated by dividing the 2035 AADT volume for each segment by the 2014 LOS E capacity. The capacity volume used in this calculation is the same as is utilized in the existing daily V/C equation.

The future AADT daily volumes are generated by applying an average annual compound growth rate (ACGR) to each 2014 AADT segment volume. The following equation is used to apply the average annual compound growth rate:

2035 AADT = 2014 AADT x ((1+ACGR)^(2035-2014))

The ACGR for each segment is defined by comparing the total volumes in the 2010 Arizona Travel Demand Model (AZTDM2) to the 2035 AZTDM2 traffic volumes at each existing HPMS count station location throughout the corridor. Each 2010 and 2035 segment volume is defined using the same weighted average equation described in the *Existing Daily V/*C section above and then summing the directional volumes for each location. The following equation is used to determine the ACGR for each segment:

ACGR = ((2035 Volume/2010 Volume)^(1/(2035-2010))))-1

Secondary Mobility Measures

Four secondary measures are evaluated:

- Future Congestion
- Peak Congestion
- Travel Time Reliability
  - Closure Extent
  - Directional Travel Time Index
  - Directional Planning Time Index
- Multimodal Opportunities
  - % Bicycle Accommodation
  - % Non-Single Occupancy Vehicle (SOV) Trips
  - % Transit Dependency

Future Congestion: The future daily V/C ratios for each segment in the corridor that are calculated and used in the Mobility Index as part of the overall average between Existing Daily V/C and Future Daily V/C are applied independently as a secondary measure. The methods to calculate the Future Daily V/C can be referenced in the Mobility Index section.

Peak Congestion: Peak Congestion has been defined as the peak hour V/C ratio in both directions of the corridor. The peak hour V/C ratio is calculated using the HERS method as described previously. The peak hour volume utilizes the directional AADT for each segment, which is calculated by applying a weighted average across the length of the segment based on the individual directional 24-hour volumes and distances associated with each HPMS count station within each segment. The segment capacity is defined based on the characteristics of each segment including number of lanes, terrain type, and environment, similar to the 24-hour volumes using the HERS method.

Travel Time Reliability: Travel time reliability is a secondary measure that includes three indicators. The three indicators are the number of times a piece of a corridor is closed for any specific reason, the directional Travel Time Index (TTI), and the directional Planning Time Index (PTI).

Closure Extent: The number of times a roadway is closed is documented through the HCRS dataset. Closure Extent is defined as the average number of times a particular milepost of the corridor is closed per year per mile in a specific direction of travel. The weighted average of each occurrence takes into account the distance over which a specific occurrence spans.

Thresholds that determine levels of good, fair, and poor are based on the average number of closures per mile per year within each of the identified statewide significant corridors by ADOT. The thresholds shown at the end of this section represent statewide averages across those corridors.

Directional Travel Time and Planning Time Index: In terms of overall mobility, the TTI is the relationship of the mean peak period travel time in a specific section of the corridor to the free-flow travel time in the same location. The PTI is the relationship of the 95th percentile highest travel time to the free-flow travel time (based on the posted speed limit) in a specific section of the corridor. The TTI and PTI can be converted into speed-based indices by recognizing that speed is equal to distance traveled divided by travel time. The inverse relationship between travel time and speed means that the 95th percentile highest travel time corresponds to the 5th percentile lowest speed.

Using HERE data provided by ADOT, four time periods for each data point were collected throughout the day (AM peak, mid-day, PM peak, and off-peak). Using the mean speeds and 5th percentile lowest mean speeds collected over 2014 for these time periods for each data location, four TTI and PTI calculations were made using the following formulas:

TTI = Posted Speed Limit/Mean Peak Hour Speed

PTI = Posted Speed Limit/5th Percentile Lowest Speed

The highest value of the four time periods calculation is defined as the TTI for that data point. The average TTI is calculated within each segment based on the number of data points collected. The value of the average TTI across each entry is used as the TTI for each respective segment within the corridor.

Multimodal Opportunities: Three multimodal opportunity indicators reflect the characteristics of the corridor that promote alternate modes to a single occupancy vehicle (SOV) for trips along the corridor. The three indicators include the percent bicycle accommodation, non-SOV trips, and transit dependency along the corridor.

Percent Bicycle Accommodation: For this secondary performance evaluation, outside shoulder widths are evaluated considering the roadway's context and conditions. This requires use of the roadway data that includes right shoulder widths, shoulder surface types, and speed limits, all of which are available in the following ADOT geographic information system (GIS) data sets:

- Right Shoulder Widths
- Left Shoulder Widths (for undivided roadways)
- Shoulder Surface Type (Both Left/Right)
- Speed Limit

Additionally, each segment's average AADT, estimated earlier in the Mobility performance area methodology, is used for the criteria to determine if the existing shoulder width meets the effective width.

The criteria for screening if a shoulder segment meets the recommended width criteria are as followed:

(1) If AADT <= 1500 OR Speed Limit <= 25 miles per hour (mph):
The segment's general purpose lane can be shared with bicyclists (no effective shoulder width required)

(2) If AADT > 1500 AND Speed Limit between (25 - 50 mph) AND Pavement Surface is Paved:
Effective shoulder width required is 4 feet or greater

(3) If AADT > 1500 AND Speed Limit >= 50 mph and Pavement Surface is Paved:
Effective shoulder width required is 6 feet or greater

The summation of the length of the shoulder sections that meet the defined effective width criteria, based on criteria above, is divided by the segment's total length to estimate the percent of the segment that accommodates bicycles as illustrated at the end of this section. If shoulder data is not available or appears erroneous, field measurements can substitute for the shoulder data.

Percent Non-SOV Trips: The percentage of non-SOV trips over distances less than 50 miles gives an indication of travel patterns along a section of the corridor that could benefit from additional multimodal options in the future.

Thresholds that determine levels of good, fair, and poor are based on the percent non-SOV trips within each of the identified statewide significant corridors by ADOT. The thresholds shown at the end of this section represent statewide averages across those corridors.

Percent Transit Dependency: 2008-2012 U.S. Census American Community Survey tract and state level geographic data and attributes from the tables B08201 (Number of Vehicles Available by Household Size) and B17001 (Population in Poverty within the Last 12 Months) were downloaded with margins of error included from the Census data retrieval application Data Ferret. Population ranges for each tract were determined by adding and subtracting the margin of error to each estimate in excel. The tract level attribute data was then joined to geographic tract data in GIS. Only tracts within a one mile buffer of each corridor are considered for this evaluation.

Tracts that have a statistically significantly larger number of either people in poverty or households with only one or no vehicles available than the state average are considered potentially transit dependent.

Example: The state average for zero or one vehicles households (HHs) is between 44.1% and 45.0%. Tracts which have the lower bound of their range above the upper bound of the state range have a greater percentage of zero/one vehicle HHs than the state average. Tracts that have their upper bound beneath the lower bound of the state range have a lesser percentage of zero/one vehicles HHs than the state average. All other tracts that have one of their bounds overlapping with the state average cannot be considered statistically significantly different because there is a chance the value is actually the same.

In addition to transit dependency, the following attributes are added to the Multimodal Opportunities map based on available data.

- Shoulder width throughout the corridor based on 'Shoulder Width' GIS dataset provided by ADOT
- Intercity bus routes
- Multiuse paths within the corridor right-of-way, if applicable

Scoring:

Volume-to-Capacity Ratios		
Urban and Fringe Urban		
Good - LOS A-C	V/C ≤ 0.71	*Note - ADOT Roadway Design Standards indicate Urban and Fringe Urban roadways should be designed to level of service C or better
Fair - LOS D	V/C > 0.71 & ≤ 0.89	
Poor - LOS E or less	V/C > 0.89	
Rural		
Good - LOS A-B	V/C ≤ 0.56	*Note - ADOT Roadway Design Standards indicate Rural roadways should be designed to level of service B or better
Fair - LOS C	V/C > 0.56 & ≤ 0.76	
Poor - LOS D or less	V/C > 0.76	

Performance Level	Closure Extent
Good	≤ 0.22
Fair	> 0.22 & ≤ 0.62
Poor	V/C > 0.62

Performance Level	TTI on Uninterrupted Flow Facilities
Good	< 1.15
Fair	≥ 1.15 & < 1.33
Poor	≥ 1.33

Performance Level	TTI on Interrupted Flow Facilities
Good	< 1.30
Fair	≥ 1.30 & < 1.2.00
Poor	≥ 2.00

Performance Level	PTI on Uninterrupted Flow Facilities
Good	< 1.30
Fair	≥ 1.30 & < 1.50
Poor	≥ 1.50

Performance Level	PTI Interrupted Flow Facilities
Good	< 3.00
Fair	≥ 3.00 & < 6.00
Poor	≥ 6.00

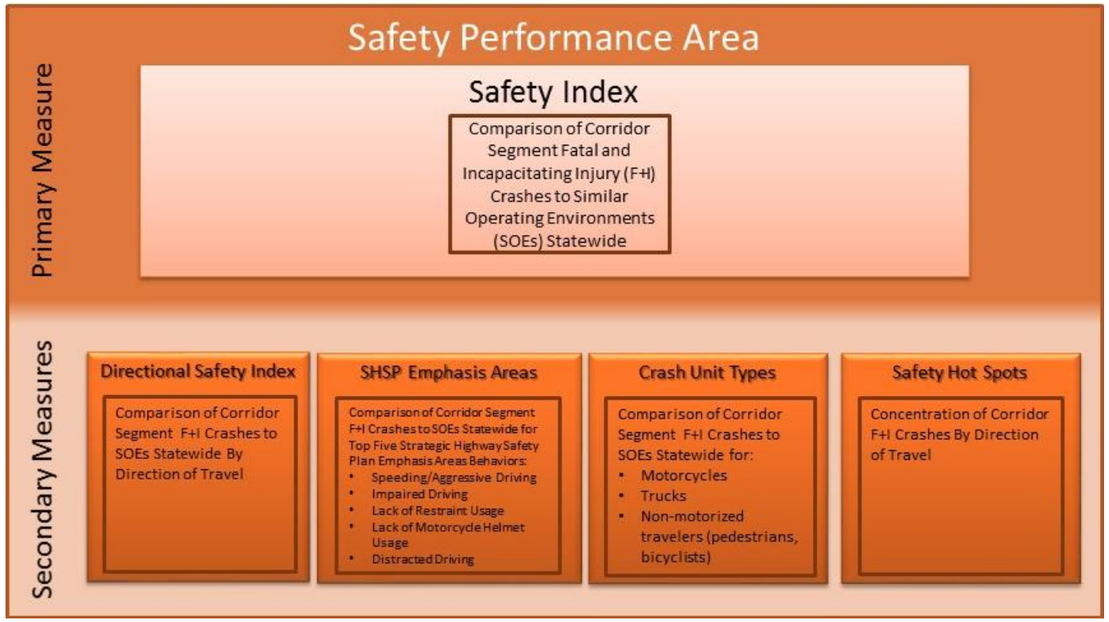
Performance Level	Percent Bicycle Accommodation
Good	≥ 90%
Fair	> 60% & ≤ 90%
Poor	< 60%

Performance Level	Percent Non-SOV Trips
Good	≥ 17%
Fair	> 11% & ≤ 17%
Poor	< 11%

Performance Level	Percent Transit Dependency
Good	Tracts with both zero and one vehicle household population in poverty percentages below the statewide average
Fair	Tracts with either zero and one vehicle household or population in poverty percentages below the statewide average
Poor	Tracts with both zero and one vehicle household and population in poverty percentages above the statewide average

Safety Performance Area Calculation Methodologies

This section summarizes the approach for developing the primary and secondary performance measures in the Safety performance area as shown in the following graphic:



Primary Safety Index

The Safety Index is a safety performance measure based on the bi-directional (i.e., both directions combined) frequency and rate of fatal and incapacitating injury crashes, the relative cost of those types of crashes, and crash occurrences on similar roadways in Arizona. According to ADOT's 2010 Highway Safety Improvement Program Manual, fatal crashes have an estimated cost that is 14.5 times the estimated cost of incapacitating injury crashes ($5.8 million compared to $400,000).

The Combined Safety Score (CSS) is an interim measure that combines fatal and incapacitating injury crashes into a single value. The CSS is calculated using the following generalized formula:

*CSS = 14.5 * (Normalized Fatal Crash Rate + Frequency) + (Normalized Incapacitating Injury Crash Rate + Frequency)*

Because crashes vary depending on the operating environment of a particular roadway, statewide CSS values were developed for similar operating environments defined by functional classification, urban vs. rural setting, number of travel lanes, and traffic volumes. To determine the Safety Index of a particular segment, the segment CSS is compared to the average statewide CSS for the similar statewide operating environment.

The Safety Index is calculated using the following formula:

Safety Index = Segment CSS / Statewide Similar Operating Environment CSS

The average annual Safety Index for a segment is compared to the statewide similar operating environment annual average, with one standard deviation from the statewide average forming the scale break points.

The more a particular segment's Safety Index value is below the statewide similar operating environment average, the better the safety performance is for that particular segment as a lower value represents fewer crashes.

Scoring:

The scale for rating the Safety Index depends on the operating environments selected, as shown in the table below.

Similar Operating Environment	Safety Index (Overall & Directional)	
	Lower Limit of Average*	Upper Limit of Average*
2 or 3 Lane Undivided Highway	0.94	1.06
2 or 3 or 4 Lane Divided Highway	0.77	1.23
4 or 5 Lane Undivided Highway	0.80	1.20
6 Lane Highway	0.56	1.44
Rural 4 Lane Freeway with Daily Volume < 25,000	0.73	1.27
Rural 4 Lane Freeway with Daily Volume > 25,000	0.68	1.32
Urban 4 Lane Freeway	0.79	1.21
Urban or Rural 6 Lane Freeway	0.82	1.18
Urban > 6 Lane Freeway	0.80	1.20

** Lower/upper limit of Average calculated as one standard deviation below/above the Mean*

Some corridor segments may have a very low number of total fatal and incapacitating injury crashes. Low crash frequencies (i.e., a small sample size) can translate into performance ratings that can be unstable. In some cases, a change in crash frequency of one crash (one additional crash or one less crash) could result in a change in segment performance of two levels. To avoid reliance on performance ratings where small changes in crash frequency result in large changes in performance, the following two criteria were developed to identify segments with "insufficient data" for assessing performance for the Safety Index. Both of these criteria must be met for a segment to have "insufficient data" to reliably rate the Safety Index performance:

- If the crash sample size (total fatal plus incapacitating injury crashes) for a given segment is less than five crashes over the five-year analysis period; AND
- If a change in one crash results in a change in segment performance by two levels (i.e., a change from below average to above average performance or a change from above

average to below average frequency), the segment has “insufficient data” and Safety Index performance ratings are unreliable.

Secondary Safety Measures

The Safety performance area has four secondary measures related to fatal and incapacitating injury crashes:

- Directional Safety Index
- Strategic Highway Safety Plan (SHSP) Behavior Emphasis Areas
- Crash Unit Types
- Safety Hot Spots

Directional Safety Index: The Direction Safety Index shares the same calculation procedure and thresholds as the Safety Index. However, the measure is based on the directional frequency and rate of fatal and incapacitating injury crashes.

Similar to the Safety Index, the segment CSS is compared to the average statewide CSS for the similar statewide operating environment. The Directional Safety Index follows the lead of the Safety Index in terms of “insufficient data” status. If the Safety Index meets both criteria for “insufficient data”, the Directional Safety Index should also be changed to “insufficient data”. If the Safety Index does not meet both criteria for “insufficient data”, the Directional Safety Index would also not change to say “insufficient data”

SHSP Behavior Emphasis Areas: ADOT’s 2014 SHSP identifies several emphasis areas for reducing fatal and incapacitating injury crashes. The top five SHSP emphasis areas relate to the following driver behaviors:

- Speeding and aggressive driving
- Impaired driving
- Lack of restraint usage
- Lack of motorcycle helmet usage
- Distracted driving

To develop a performance measure that reflects these five emphasis areas, the percentage of total fatal and incapacitating injury crashes that involves at least one of the emphasis area driver behaviors on a particular segment is compared to the statewide average percentage of crashes involving at least one of the emphasis area driver behaviors on roads with similar operating environments in a process similar to how the Safety Index is developed.

To increase the crash sample size for this performance measure, the five behavior emphasis areas are combined to identify fatal and incapacitating injury crashes that exhibit one or more of the behavior emphasis areas.

The SHSP behavior emphasis areas performance is calculated using the following formula:

% Crashes Involving SHSP Behavior Emphasis Areas = Segment Crashes Involving SHSP Behavior Emphasis Areas / Total Segment Crashes

The percentage of total crashes involving SHSP behavior emphasis areas for a segment is compared to the statewide percentages on roads with similar operating environments. One standard deviation from the statewide average percentage forms the scale break points.

When assessing the performance of the SHSP behavior emphasis areas, the more the frequency of crashes involving SHSP behavior emphasis areas is below the statewide average implies better levels of segment performance. Thus, lower values are better, similar to the Safety Index.

Scoring:

The scale for rating the SHSP behavior emphasis areas performance depends on the crash history on similar statewide operating environments, as shown in the table below:

Similar Operating Environment	Crashes in SHSP Top 5 Emphasis Areas	
	Lower Limit of Average*	Upper Limit of Average*
2 or 3 Lane Undivided Highway	51.2%	57.5%
2 or 3 or 4 Lane Divided Highway	44.4%	54.4%
4 or 5 Lane Undivided Highway	42.4%	51.1%
6 Lane Highway	35.3%	46.5%
Rural 4 Lane Freeway with Daily Volume < 25,000	42.8%	52.9%
Rural 4 Lane Freeway with Daily Volume > 25,000	40.8%	57.1%
Urban 4 Lane Freeway	49.1%	59.4%
Urban or Rural 6 Lane Freeway	33.5%	57.2%
Urban > 6 Lane Freeway	42.6%	54.8%

** Lower/upper limit of Average calculated as one standard deviation below/above the Mean*

The SHSP behavior emphasis areas secondary safety performance measure for the Safety performance area includes proportions of specific types of crashes within the total fatal and incapacitating injury crash frequencies. This more detailed categorization of fatal and incapacitating injury crashes can result in low crash frequencies (i.e., a small sample size) that translate into performance ratings that can be unstable. In some cases, a change in crash frequency of one crash (one additional crash or one less crash) could result in a change in segment performance of two levels. To avoid reliance on performance ratings where small changes in crash frequency result in large changes in performance, the following criteria were developed to identify segments with “insufficient data” for assessing performance for the SHSP behavior emphasis areas secondary safety performance measure. If any of these criteria are met for a segment, that segment has “insufficient data” to reliably rate the SHSP behavior emphasis areas performance:

- If the crash sample size (total fatal plus incapacitating injury crashes) for a given segment is less than five crashes over the five-year analysis period, the segment has “insufficient data” and performance ratings are unreliable. OR
- If a change in one crash results in a change in segment performance by two levels (i.e., a change from below average to above average performance or a change from above average to below average frequency), the segment has “insufficient data” and performance ratings are unreliable. OR
- If the corridor average segment crash frequency for the SHSP behavior emphasis areas performance measure is less than two crashes over the five-year analysis period, the entire SHSP behavior emphasis areas performance measure has “insufficient data” and performance ratings are unreliable.

Crash Unit Type Emphasis Areas: ADOT’s SHSP also identifies emphasis areas that relate to the following “unit-involved” crashes:

- Heavy vehicle (trucks)-involved crashes
- Motorcycle-involved crashes
- Non-motorized traveler (pedestrians and bicyclists)-involved crashes

To develop a performance measure that reflects the aforementioned crash unit type emphasis areas, the percentage of total fatal and incapacitating injury crashes that involves a given crash unit type emphasis area on a particular segment is compared to the statewide average percentage of crashes involving that same crash unit type emphasis area on roads with similar operating environments in a process similar to how the Safety Index is developed.

The SHSP crash unit type emphasis areas performance is calculated using the following formula:

% Crashes Involving Crash Unit Type = Segment Crashes Involving Crash Unit Type / Total Segment Crashes

The percentage of total crashes involving crash unit types for a segment is compared to the statewide percentages on roads with similar operating environments. One standard deviation from the statewide average percentage forms the scale break points.

When assessing the performance of the crash unit types, the more the frequency of crashes involving crash unit types is below the statewide average implies better levels of segment performance. Thus, lower values are better, similar to the Safety Index. The scale for rating the unit-involved crash performance depends on the crash history on similar statewide operating environments, as shown in the following tables.

Scoring:

Similar Operating Environment	Crashes Involving Trucks	
	Lower Limit of Average*	Upper Limit of Average*
2 or 3 Lane Undivided Highway	5.2%	7.1%
2 or 3 or 4 Lane Divided Highway	3.5%	7.3%
4 or 5 Lane Undivided Highway	6.1%	9.6%
6 Lane Highway	0.3%	8.7%
Rural 4 Lane Freeway with Daily Volume < 25,000	13.2%	17.0%
Rural 4 Lane Freeway with Daily Volume > 25,000	7.2%	12.9%
Urban 4 Lane Freeway	6.8%	10.9%
Urban or Rural 6 Lane Freeway	6.2%	11.0%
Urban > 6 Lane Freeway	2.5%	6.0%

** Lower/upper limit of Average calculated as one standard deviation below/above the Mean*

Similar Operating Environment	Crashes Involving Motorcycles	
	Lower Limit of Average*	Upper Limit of Average*
2 or 3 Lane Undivided Highway	18.5%	26.5%
2 or 3 or 4 Lane Divided Highway	16.3%	26.3%
4 or 5 Lane Undivided Highway	6.4%	9.4%
6 Lane Highway	0.0%	20.0%
Rural 4 Lane Freeway with Daily Volume < 25,000	5.0%	8.5%
Rural 4 Lane Freeway with Daily Volume > 25,000	7.7%	17.1%
Urban 4 Lane Freeway	9.3%	11.5%
Urban or Rural 6 Lane Freeway	6.7%	12.9%
Urban > 6 Lane Freeway	12.6%	20.5%

** Lower/upper limit of Average calculated as one standard deviation below/above the Mean*

Similar Operating Environment	Crashes Involving Non-Motorized Travelers	
	Lower Limit of Average*	Upper Limit of Average*
2 or 3 Lane Undivided Highway	2.2%	4.2%
2 or 3 or 4 Lane Divided Highway	2.4%	4.5%
4 or 5 Lane Undivided Highway	4.7%	7.9%
6 Lane Highway	8.4%	17.4%
Rural 4 Lane Freeway with Daily Volume < 25,000	1.7%	2.5%
Rural 4 Lane Freeway with Daily Volume > 25,000	0.0%	0.0%
Urban 4 Lane Freeway	4.8%	10.3%
Urban or Rural 6 Lane Freeway	0.9%	6.7%
Urban > 6 Lane Freeway	0.5%	1.5%

** Lower/upper limit of Average calculated as one standard deviation below/above the Mean*

The crash unit types have the same "insufficient data" criteria as the SHSP behavior emphasis areas.

Safety Hot Spots: A hot spot analysis was conducted that identified abnormally high concentrations of fatal and incapacitating injury crashes along the study corridor by direction of travel. The identification of crash concentrations involves a GIS-based function known as "kernel density analysis". This measure is mapped for graphical display purposes with the Directional Safety Index but is not included in the Safety performance area rating calculations.

Freight Performance Area Calculation Methodologies

This section summarizes the approach for developing the primary and secondary performance measures in the Freight performance area as shown in the following graphic:

Primary Freight Index

The Freight Index is a reliability performance measure based on the planning time index for truck travel. The industry standard definition for the Truck Planning Time Index (TPTI) is the ratio of total travel time needed for 95% on-time arrival to free-flow travel time. The TPTI reflects the extra buffer time needed for on-time delivery while accounting for non-recurring delay. Non-recurring delay refers to unexpected or abnormal delay due to closures or restrictions resulting from circumstances such as crashes, inclement weather, and construction activities.

The TPTI can be converted into a speed-based index by recognizing that speed is equal to distance traveled divided by travel time. The inverse relationship between travel time and speed means that the 95th percentile highest travel time corresponds to the 5th percentile lowest speed. The speed-based TPTI is calculated using the following formula:

TPTI = Free-Flow Truck Speed / Observed 5th Percentile Lowest Truck Speed

Observed 5th percentile lowest truck speeds are available in the 2014 American Digital Cartography, Inc. HERE (formerly NAVTEQ) database to which ADOT has access. The free-flow truck speed is assumed to be 65 miles per hour or the posted speed, whichever is less. This upper limit of 65 mph accounts for governors that trucks often have that restrict truck speeds to no more than 65 mph, even when the speed limit may be higher.

For each corridor segment, the TPTI is calculated for each direction of travel and then averaged to create a bi-directional TPTI. When assessing performance using TPTI, the higher the TPTI value is above 1.0, the more buffer time is needed to ensure on-time delivery.

The Freight Index is calculated using the following formula to invert the overall TPTI:

Freight Index = 1 / Bi-directional TPTI

Inversion of the TPTI allows the Freight Index to have a scale where the higher the value, the better the performance, which is similar to the directionality of the scales of most of the other primary measures. This Freight Index scale is based on inverted versions of TPTI scales created previously by ADOT. The scale for rating the Freight Index differs between uninterrupted and interrupted flow facilities.

Secondary Freight Measures

The Freight performance area includes five secondary measures that provide an in-depth evaluation of the different characteristics of freight performance:

- Recurring Delay (Directional TTTI)
- Non-Recurring Delay (Directional TPTI)
- Closure Duration
- Bridge Vertical Clearance
- Bridge Vertical Clearance Hot Spots

Recurring Delay (Directional TTTI): The performance measure for recurring delay is the Directional Truck Travel Time Index (TTTI). The industry standard definition for TTTI is the ratio of average peak period travel time to free-flow travel time. The TTTI reflects the extra time spent in traffic during peak times due to recurring delay. Recurring delay refers to expected or normal delay due to roadway capacity constraints or traffic control devices.

Similar to the TPTI, the TTTI can be converted into a speed-based index by recognizing that speed is equal to distance traveled divided by travel time. The speed-based TTTI can be calculated using the following formula:

TTTI = Free-Flow Truck Speed / Observed Average Peak Period Truck Speed

Observed average peak period truck speeds are available in the 2014 American Digital Cartography, Inc. HERE (formerly NAVTEQ) database to which ADOT has access. The free-flow truck speed is assumed to be 65 mph or the posted speed, whichever is less.

For each corridor segment, the TTTI is calculated for each direction of travel. With the TTTI, the higher the TTTI value is above 1.0, the more time is spent in traffic during peak times. TTTI values

are generally lower than TPTI values. The Directional TTTI scale is based on TTTI scales created previously by ADOT.

Non-Recurring Delay (Directional TPTI): The performance measure for non-recurring delay is the Directional TPTI. Directional TPTI is calculated as described previously as an interim step in the development of the Freight Index.

For each corridor segment, the TPTI is calculated for each direction of travel. With the TPTI, the higher the TPTI value is above 1.0, the more buffer time is needed to ensure on-time delivery.

Closure Duration: This performance measure related to road closures is average roadway closure (i.e., full lane closure) duration time in minutes. There are three main components to full closures that affect reliability – frequency, duration, and extent. In the freight industry, closure duration is the most important component because trucks want to minimize travel time and delay.

Data on the frequency, duration, and extent of full roadway closures on the ADOT State Highway System is available for 2010-2014 in the HCRS database that is managed and updated by ADOT.

The average closure duration in a segment – in terms of the average time a milepost is closed per mile per year on a given segment – is calculated using the following formula:

*Closure Duration = Sum of Segment (Closure Clearance Time * Closure Extent) / Segment Length*

The segment closure duration time in minutes can then be compared to statewide averages for closure duration in minutes, with one-half standard deviation from the average forming the scale break points. The scale for rating closure duration in minutes is found at the end of this section.

Bridge Vertical Clearance: This performance measure uses the vertical clearance information from the ADOT Bridge Database to identify locations with low vertical clearance. The minimum vertical clearance for all underpass structures (i.e., structures under which mainline traffic passes) is determined for each segment.

Bridge Vertical Clearance Hot Spots: This performance measure related to truck restrictions is the locations, or hot spots, where bridge vertical clearance issues restrict truck travel. Sixteen feet three inches (16.25') is the minimum standard vertical clearance value for state highway bridges over travel lanes.

Locations with lower vertical clearance values than the minimum standard are categorized by the ADOT Intermodal Transportation Department Engineering Permits Section as either locations where ramps exist that allow the restriction to be avoided or locations where ramps do not exist and the restriction cannot be avoided. The locations with vertical clearances below the minimum standard that cannot be ramped around are considered hot spots. This measure is mapped for graphical display purposes with the bridge vertical clearance map but is not included in the Freight performance area rating calculations.

Scoring:

Performance Level	Freight Index	
	Uninterrupted Flow Facilities	Interrupted Flow Facilities
Good	> 0.77	> 0.33
Fair	0.67 – 0.77	0.17 – 0.33
Poor	< 0.67	< 0.17

Performance Level	TTTI	
	Uninterrupted Flow Facilities	Interrupted Flow Facilities
Good	< 1.15	< 1.30
Fair	1.15 – 1.33	1.30 – 2.00
Poor	> 1.33	> 2.00

Performance Level	TPTI	
	Uninterrupted Flow Facilities	Interrupted Flow Facilities
Good	< 1.30	< 3.00
Fair	1.30 – 1.50	3.00 – 6.00
Poor	> 1.50	> 6.00

Performance Level	Closure Duration (minutes)
Good	< 44.18
Fair	44.18 – 124.86
Poor	> 124.86

Performance Level	Bridge Vertical Clearance
Good	> 16.5'
Fair	16.0' – 16.5'
Poor	< 16.0'

Appendix C: Performance Area Data

Pavement Performance Area Data

				Direction 1 (Northound)			Direction 2 (Southbound)			Direction 1 (Northbound)		Direction 2 (Southbound)		Composite		Pavement Index	% Pavement Failure	
				# of Lanes	IRI	Cracking	# of Lanes	IRI	Cracking	PSR	PDI	PSR	PDI	Dir 1 (NB)	Dir 2 (SB)		Dir 1 (NB)	Dir 2 (SB)
Segment 1		*Interstate?*		No														
Milepost	420	to	421	4	0.00	0.00		0.00	0.00	5.00	5.0	-	-	5.00	-		0	0
Milepost	421	to	422	4	50.64	0.00		0.00	0.00	4.12	5.0	-	-	4.39	-		0	0
Milepost	422	to	423	4	47.75	0.00		0.00	0.00	4.17	5.0	-	-	4.42	-		0	0
Milepost	423	to	424	4	43.77	0.00		0.00	0.00	4.23	5.0	-	-	4.46	-		0	0
Milepost	424	to	425	4	51.42	0.00		0.00	0.00	4.11	5.0	-	-	4.38	-		0	0
Milepost	425	to	426	4	57.22	2.00		0.00	0.00	4.02	4.5	-	-	4.15	-		0	0
Milepost	426	to	427	4	69.42	5.00		0.00	0.00	3.84	4.0		-	3.89	-		0	0
Milepost	427	to	428	2	68.28	4.00	2	130.82	4.00	3.86	4.1	3.04	4.1	3.94	3.37		0	0
			Total	30			2											0
			Weighted Average							4.19	4.74	3.04	4.14	4.35	3.37			
			Factor							1.00		1.00						
			Indicator Score							4.19		3.04						0.0%
			Pavement Index													4.29		
Segment 2		*Interstate?*		No														
Milepost	428	to	429	2	63.92	4.00	2	68.96	4.00	3.92	4.1	3.85	4.1	3.99	3.93		0	0
Milepost	429	to	430	2	67.30	3.00	2	58.21	3.00	3.87	4.3	4.01	4.3	4.00	4.09		0	0
Milepost	430	to	431	2	81.93	2.00	2	64.55	4.00	3.66	4.5	3.91	4.1	3.90	3.98		0	0
Milepost	431	to	432	2	91.84	2.00	2	77.18	1.00	3.53	4.5	3.73	4.7	3.81	4.01		0	0
Milepost	432	to	433	2	98.84	5.00	2	65.58	2.00	3.43	4.0	3.90	4.5	3.60	4.06		0	0
Milepost	433	to	434	2	91.77	3.00	2	61.51	0.00	3.53	4.3	3.96	5.0	3.76	4.27		0	0
Milepost	434	to	435	2	82.02	2.00	2	64.14	0.00	3.66	4.5	3.92	5.0	3.90	4.24		0	0
Milepost	435	to	436	2	80.10	10.00	2	44.50	1.00	3.69	3.4	4.22	4.7	3.50	4.35		0	0
Milepost	436	to	437	2	74.55	5.00	2	44.57	0.00	3.77	4.0	4.22	5.0	3.84	4.45		0	0
Milepost	437	to	438	2	78.81	6.00	2	47.19	3.00	3.71	3.9	4.18	4.3	3.76	4.21		0	0
Milepost	438	to	439	2	72.58	3.00	2	49.84	1.00	3.79	4.3	4.14	4.7	3.94	4.29		0	0
Milepost	439	to	440	2	81.19	3.00	2	44.14	0.00	3.67	4.3	4.23	5.0	3.86	4.46		0	0
Milepost	440	to	441	2	88.49	8.00	2	48.30	1.00	3.57	3.6	4.16	4.7	3.59	4.31		0	0
Milepost	441	to	442	2	62.54	5.00	2	48.82	0.00	3.94	4.0	4.15	5.0	3.96	4.41		0	0
			Total	28			28											0
			Weighted Average							3.70	4.11	4.04	4.64	3.81	4.22			
			Factor							1.00		1.00						
			Indicator Score							3.70		4.04						0.0%
			Pavement Index													4.02		

				Direction 1 (Northound)			Direction 2 (Southbound)			Direction 1 (Northbound)		Direction 2 (Southbound)		Composite		Pavement Index	% Pavement Failure	
				# of Lanes	IRI	Cracking	# of Lanes	IRI	Cracking	PSR	PDI	PSR	PDI	Dir 1 (NB)	Dir 2 (SB)		Dir 1 (NB)	Dir 2 (SB)
Segment 3		*Interstate?*		No														
Milepost	442	to	443	1	114.08	2.00	1	110.77	0.00	3.24	4.5	3.28	5.0	3.61	3.80		0	0
Milepost	443	to	444	2	93.32	3.00		0.00	0.00	3.51	4.3	-	-	3.74	-		0	0
Milepost	444	to	445	2	135.34	2.00		0.00	0.00	2.99	4.5	-	-	3.43	-		0	0
Milepost	445	to	446	2	87.85	2.00		0.00	0.00	3.58	4.5	-	-	3.84	-		0	0
Milepost	446	to	447	2	69.85	3.00		0.00	0.00	3.83	4.3	-	-	3.97	-		0	0
Milepost	447	to	448	2	80.56	1.00		0.00	0.00	3.68	4.7	-	-	3.97	-		0	0
Milepost	448	to	449	2	125.21	3.00		0.00	0.00	3.11	4.3	-	-	3.46	-		0	0
Milepost	449	to	450	2	108.82	2.00		0.00	0.00	3.31	4.5	-	-	3.65	-		0	0
Milepost	450	to	451	2	114.91	3.00		0.00	0.00	3.23	4.3	-	-	3.55	-		0	0
Milepost	451	to	452	2	89.65	2.00		0.00	0.00	3.56	4.5	-	-	3.83	-		0	0
Milepost	452	to	453	2	91.46	6.00		0.00	0.00	3.53	3.9	-	-	3.63	-		0	0
Milepost	453	to	454	2	63.82	3.00		0.00	0.00	3.92	4.3	-	-	4.03	-		0	0
Milepost	454	to	455	2	55.77	2.00		0.00	0.00	4.05	4.5	-	-	4.17	-		0	0
Milepost	455	to	456	2	108.18	5.00		0.00	0.00	3.31	4.0	-	-	3.52	-		0	0
Milepost	456	to	457	2	124.25	2.00		0.00	0.00	3.12	4.5	-	-	3.52	-		0	0
			Total	29			1											0
			Weighted Average							3.47	4.34	3.28	5.00	3.73	3.80			
			Factor							1.00		1.00						
			Indicator Score							3.47		3.28						0.0%
			Pavement Index													3.73		
Segment 4		*Interstate?*		No														
Milepost	457	to	458	2	159.75	1.00		0.00	0.00	2.72	4.7	-	-	2.72	-		2	0
Milepost	458	to	459	2	66.12	0.00		0.00	0.00	3.89	5.0	-	-	4.22	-		0	0
Milepost	459	to	460	2	88.23	1.00		0.00	0.00	3.58	4.7	-	-	3.90	-		0	0
Milepost	460	to	461	2	100.56	6.00		0.00	0.00	3.41	3.9	-	-	3.55	-		0	0
Milepost	461	to	462	2	103.47	6.00		0.00	0.00	3.37	3.9	-	-	3.52	-		0	0
Milepost	462	to	463	2	118.16	5.00		0.00	0.00	3.19	4.0	-	-	3.43	-		0	0
Milepost	463	to	464	2	98.69	9.00		0.00	0.00	3.44	3.5	-	-	3.46	-		0	0
Milepost	464	to	465	2	56.95	0.00		0.00	0.00	4.03	5.0	-	-	4.32	-		0	0
			Total	16			0											2
			Weighted Average							3.45	4.32	#DIV/0!	#DIV/0!	3.64	#DIV/0!			
			Factor							1.00		1.00						
			Indicator Score							3.45		#DIV/0!						12.5%
			Pavement Index													3.64		

				Direction 1 (Northound)			Direction 2 (Southbound)			Direction 1 (Northbound)		Direction 2 (Southbound)		Composite		Pavement Index	% Pavement Failure	
				# of Lanes	IRI	Cracking	# of Lanes	IRI	Cracking	PSR	PDI	PSR	PDI	Dir 1 (NB)	Dir 2 (SB)		Dir 1 (NB)	Dir 2 (SB)
Segment 5		*Interstate?*		No														
Milepost	465	to	466	2	123.55	0.00		0.00	0.00	3.13	5.0	-	-	3.69	-		0	0
Milepost	466	to	467	2	105.67	0.00		0.00	0.00	3.35	5.0	-	-	3.84	-		0	0
Milepost	467	to	468	2	125.69	0.00		0.00	0.00	3.10	5.0	-	-	3.67	-		0	0
Milepost	468	to	469	2	77.92	8.00		0.00	0.00	3.72	3.6	-	-	3.66	-		0	0
Milepost	469	to	470	2	95.61	1.00		0.00	0.00	3.48	4.7	-	-	3.83	-		0	0
Milepost	470	to	471	2	143.55	1.00		0.00	0.00	2.90	4.7	-	-	2.90	-		2	0
Milepost	471	to	472	2	113.03	5.00		0.00	0.00	3.25	4.0	-	-	3.48	-		0	0
Milepost	472	to	473	2	139.58	1.00		0.00	0.00	2.94	4.7	-	-	3.46	-		0	0
Milepost	473	to	474	2	118.87	5.00		0.00	0.00	3.18	4.0	-	-	3.43	-		0	0
Milepost	474	to	475	2	160.37	4.00		0.00	0.00	2.72	4.1	-	-	2.72	-		2	0
Milepost	475	to	476	2	125.70	2.00		0.00	0.00	3.10	4.5	-	-	3.51	-		0	0
Milepost	476	to	477	2	82.11	2.00		0.00	0.00	3.66	4.5	-	-	3.90	-		0	0
Milepost	477	to	478	2	64.80	0.00		0.00	0.00	3.91	5.0	-	-	4.24	-		0	0
Milepost	478	to	479	2	72.67	0.00		0.00	0.00	3.79	5.0	-	-	4.16	-		0	0
Milepost	479	to	480	2	65.75	0.00		0.00	0.00	3.89	5.0	-	-	4.23	-		0	0
Milepost	480	to	481	2	96.82	0.00		0.00	0.00	3.46	5.0	-	-	3.92	-		0	0
Total				32			0											4
Weighted Average										3.35	4.60	#DIV/0!	#DIV/0!	3.66	#DIV/0!			
Factor										1.00		1.00						
Indicator Score										3.35		#DIV/0!						12.5%
Pavement Index																3.66		
Segment 6		*Interstate?*		No														
Milepost	481	to	482	2	60.74	0.00		0.00	0.00	3.97	5.0	-	-	4.28	-		0	0
Milepost	482	to	483	2	56.16	0.00		0.00	0.00	4.04	5.0	-	-	4.33	-		0	0
Milepost	483	to	484	2	63.66	0.00		0.00	0.00	3.93	5.0	-	-	4.25	-		0	0
Milepost	484	to	485	2	55.24	0.00		0.00	0.00	4.05	5.0	-	-	4.34	-		0	0
Milepost	485	to	486	2	63.01	4.00		0.00	0.00	3.94	4.1	-	-	4.00	-		0	0
Milepost	486	to	487	2	69.89	2.00		0.00	0.00	3.83	4.5	-	-	4.02	-		0	0
Milepost	487	to	488	2	70.74	1.00		0.00	0.00	3.82	4.7	-	-	4.07	-		0	0
Milepost	488	to	489	2	92.11	2.00		0.00	0.00	3.52	4.5	-	-	3.80	-		0	0
Milepost	489	to	490	2	129.51	1.00		0.00	0.00	3.06	4.7	-	-	3.54	-		0	0
Milepost	490	to	491	2	84.84	0.00		0.00	0.00	3.62	5.0	-	-	4.04	-		0	0
Milepost	491	to	492	2	97.64	0.00		0.00	0.00	3.45	5.0	-	-	3.92	-		0	0
Milepost	492	to	493	2	117.64	1.00		0.00	0.00	3.20	4.7	-	-	3.63	-		0	0
Milepost	493	to	494	2	104.21	3.00		0.00	0.00	3.37	4.3	-	-	3.64	-		0	0
Milepost	494	to	495	2	78.71	1.00		0.00	0.00	3.71	4.7	-	-	3.99	-		0	0
Milepost	495	to	496	2	55.01	0.00		0.00	0.00	4.06	5.0	-	-	4.34	-		0	0
Milepost	496	to	497	2	50.43	0.00		0.00	0.00	4.13	5.0	-	-	4.39	-		0	0

				Direction 1 (Northound)			Direction 2 (Southbound)			Direction 1 (Northbound)		Direction 2 (Southbound)		Composite		Pavement Index	% Pavement Failure	
				# of Lanes	IRI	Cracking	# of Lanes	IRI	Cracking	PSR	PDI	PSR	PDI	Dir 1 (NB)	Dir 2 (SB)		Dir 1 (NB)	Dir 2 (SB)
Milepost	497	to	498	2	73.20	0.00		0.00	0.00	3.79	5.0	-	-	4.15	-		0	0
		Total		34			0											0
		Weighted Average								3.73	4.76	#DIV/0!	#DIV/0!	4.04	#DIV/0!			
		Factor								1.00		1.00						
		Indicator Score								3.73		#DIV/0!						0.0%
		Pavement Index														4.04		
Segment 7		*Interstate?*		No														
Milepost	498	to	499	2	67.83	0.00		0.00	0.00	3.86	5.0	-	-	4.20	-		0	0
Milepost	499	to	500	2	54.34	0.00		0.00	0.00	4.07	5.0	-	-	4.35	-		0	0
Milepost	500	to	501	2	50.52	0.00		0.00	0.00	4.13	5.0	-	-	4.39	-		0	0
Milepost	501	to	502	2	57.31	0.00		0.00	0.00	4.02	5.0	-	-	4.32	-		0	0
Milepost	502	to	503	2	61.40	0.00		0.00	0.00	3.96	5.0	-	-	4.27	-		0	0
Milepost	503	to	504	2	54.97	0.00		0.00	0.00	4.06	5.0	-	-	4.34	-		0	0
Milepost	504	to	505	2	61.35	2.00		0.00	0.00	3.96	4.5	-	-	4.11	-		0	0
Milepost	505	to	506	2	65.20	4.00		0.00	0.00	3.90	4.1	-	-	3.97	-		0	0
Milepost	506	to	507	2	87.48	0.00		0.00	0.00	3.59	5.0	-	-	4.01	-		0	0
Milepost	507	to	508	2	82.11	1.00		0.00	0.00	3.66	4.7	-	-	3.96	-		0	0
Milepost	508	to	509	2	73.07	2.00		0.00	0.00	3.79	4.5	-	-	3.99	-		0	0
Milepost	509	to	510	2	74.96	0.00		0.00	0.00	3.76	5.0	-	-	4.13	-		0	0
Milepost	510	to	511	2	35.13	0.00		0.00	0.00	4.38	5.0	-	-	4.56	-		0	0
Milepost	511	to	512	2	32.91	0.00		0.00	0.00	4.41	5.0	-	-	4.59	-		0	0
Milepost	512	to	513	2	43.63	0.00		0.00	0.00	4.24	5.0	-	-	4.47	-		0	0
Milepost	513	to	514	2	39.10	0.00		0.00	0.00	4.31	5.0	-	-	4.52	-		0	0
Milepost	514	to	515	2	40.01	5.00		0.00	0.00	4.29	4.0	-	-	4.09	-		0	0
Milepost	515	to	516	2	39.50	12.00		0.00	0.00	4.30	3.2	-	-	3.55	-		0	0
Milepost	516	to	517	2	47.64	9.00		0.00	0.00	4.17	3.5	-	-	3.72	-		0	0
Milepost	517	to	518	2	88.43	4.00		0.00	0.00	3.57	4.1	-	-	3.74	-		0	0
Milepost	518	to	519	2	98.64	7.00		0.00	0.00	3.44	3.8	-	-	3.53	-		0	0
Milepost	519	to	520	2	98.40	4.00		0.00	0.00	3.44	4.1	-	-	3.65	-		0	0
Milepost	520	to	521	2	99.17	3.00		0.00	0.00	3.43	4.3	-	-	3.69	-		0	0
Milepost	521	to	522	2	105.90	6.00		0.00	0.00	3.34	3.9	-	-	3.50	-		0	0
Milepost	522	to	523	2	132.02	6.00		0.00	0.00	3.03	3.9	-	-	3.28	-		0	0
Milepost	523	to	524	2	132.12	6.00		0.00	0.00	3.03	3.9	-	-	3.28	-		0	0
		Total		52			0											0
		Weighted Average								3.85	4.48	#DIV/0!	#DIV/0!	4.01	#DIV/0!			
		Factor								1.00		1.00						
		Indicator Score								3.85		#DIV/0!						0.0%
		Pavement Index														4.01		

				Direction 1 (Northound)			Direction 2 (Southbound)			Direction 1 (Northbound)		Direction 2 (Southbound)		Composite		Pavement Index	% Pavement Failure	
				# of Lanes	IRI	Cracking	# of Lanes	IRI	Cracking	PSR	PDI	PSR	PDI	Dir 1 (NB)	Dir 2 (SB)		Dir 1 (NB)	Dir 2 (SB)
Segment 8		*Interstate?*		No														
Milepost	524	to	525	2	80.71	80.00		0.00	0.00	3.68	0.0	-	-	0.00	-		2	0
Milepost	525	to	526	2	94.04	0.00		0.00	0.00	3.50	5.0	-	-	3.95	-		0	0
Milepost	526	to	527	2	90.95	0.00		0.00	0.00	3.54	5.0	-	-	3.98	-		0	0
Milepost	527	to	528	2	57.68	1.00		0.00	0.00	4.02	4.7	-	-	4.21	-		0	0
Milepost	528	to	529	2	47.56	0.00		0.00	0.00	4.17	5.0	-	-	4.42	-		0	0
Milepost	529	to	530	2	50.28	0.00		0.00	0.00	4.13	5.0	-	-	4.39	-		0	0
Milepost	530	to	531	2	46.30	3.00		0.00	0.00	4.19	4.3	-	-	4.22	-		0	0
Milepost	531	to	532	2	62.93	0.00		0.00	0.00	3.94	5.0	-	-	4.26	-		0	0
Milepost	532	to	533	2	81.09	3.00		0.00	0.00	3.67	4.3	-	-	3.86	-		0	0
Milepost	533	to	534	2	72.29	20.00		0.00	0.00	3.80	2.5	-	-	2.51	-		2	0
Milepost	534	to	535	2	82.23	5.00		0.00	0.00	3.66	4.0	-	-	3.76	-		0	0
Milepost	535	to	536	2	82.94	3.00		0.00	0.00	3.65	4.3	-	-	3.84	-		0	0
Milepost	536	to	537	2	85.87	3.00		0.00	0.00	3.61	4.3	-	-	3.81	-		0	0
Milepost	537	to	538	2	98.97	1.00		0.00	0.00	3.43	4.7	-	-	3.80	-		0	0
Milepost	538	to	539	2	87.99	0.00		0.00	0.00	3.58	5.0	-	-	4.01	-		0	0
Milepost	539	to	540	2	59.35	3.00		0.00	0.00	3.99	4.3	-	-	4.08	-		0	0
Milepost	540	to	541	2	89.38	3.00		0.00	0.00	3.56	4.3	-	-	3.78	-		0	0
Milepost	541	to	542	2	100.22	8.00		0.00	0.00	3.42	3.6	-	-	3.48	-		0	0
Milepost	542	to	543	2	88.38	2.00		0.00	0.00	3.57	4.5	-	-	3.84	-		0	0
Milepost	543	to	544	2	80.27	0.00		0.00	0.00	3.69	5.0	-	-	4.08	-		0	0
Milepost	544	to	545	2	76.29	2.00		0.00	0.00	3.74	4.5	-	-	3.96	-		0	0
Milepost	545	to	546	2	65.59	4.00		0.00	0.00	3.90	4.1	-	-	3.97	-		0	0
Milepost	546	to	547	2	141.58	1.00		0.00	0.00	2.92	4.7	-	-	3.44	-		0	0
			Total	46			0											4
			Weighted Average							3.71	4.26	#DIV/0!	#DIV/0!	3.72	#DIV/0!			
			Factor							1.00		1.00						
			Indicator Score							3.71		#DIV/0!						8.7%
			Pavement Index													3.72		
Segment 9		*Interstate?*		No														
Milepost	547	to	548	2	106.69	25.00		0.00	0.00	3.33	2.1	-	-	2.11	-		2	0
Milepost	548	to	549	2	107.00	3.00		0.00	0.00	3.33	4.3	-	-	3.62	-		0	0
Milepost	549	to	550	2	142.75	6.00		0.00	0.00	2.91	3.9	-	-	3.20	-		2	0
			Total	6			0											4
			Weighted Average							3.19	3.42	#DIV/0!	#DIV/0!	2.98	#DIV/0!			
			Factor							1.00		1.00						
			Indicator Score							3.19		#DIV/0!						66.7%
			Pavement Index													2.98		

				Direction 1 (Northound)			Direction 2 (Southbound)			Direction 1 (Northbound)		Direction 2 (Southbound)		Composite		Pavement Index	% Pavement Failure	
				# of Lanes	IRI	Cracking	# of Lanes	IRI	Cracking	PSR	PDI	PSR	PDI	Dir 1 (NB)	Dir 2 (SB)		Dir 1 (NB)	Dir 2 (SB)
Segment 10		*Interstate?*		No														
Milepost	550	to	551	2	68.05	5.00		0.00	0.00	3.86	4.0	-	-	3.90	-		0	0
Milepost	551	to	552	2	70.59	3.00		0.00	0.00	3.82	4.3	-	-	3.96	-		0	0
Milepost	552	to	553	2	74.06	5.00		0.00	0.00	3.77	4.0	-	-	3.84	-		0	0
Milepost	553	to	554	2	69.21	12.00		0.00	0.00	3.84	3.2	-	-	3.41	-		0	0
Milepost	554	to	555	2	57.72	3.00		0.00	0.00	4.02	4.3	-	-	4.10	-		0	0
Milepost	555	to	556	2	70.13	5.00		0.00	0.00	3.83	4.0	-	-	3.88	-		0	0
Milepost	556	to	557	2	68.21	9.00		0.00	0.00	3.86	3.5	-	-	3.63	-		0	0
			Total	14			0											0
			Weighted Average							3.86	3.90	#DIV/0!	#DIV/0!	3.82	#DIV/0!			
			Factor							1.00		1.00						
			Indicator Score							3.86		#DIV/0!						0.0%
			Pavement Index													3.82		

Bridge Performance Area Data

Structure Name (A209)	Structure # (N8)	Milepost (A232)	Area (A225)	Bridge Sufficiency	Bridge Index					Functionally Obsolete Bridges	Bridge Rating	Hot Spots on Bridge Index map
				Sufficiency Rating	Deck (N58)	Sub (N59)	Super (N60)	Eval (N67)	Lowest	Deck Area on Func Obsolete		
Segment 1												
N/A No Bridges in Segment		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		
Total			#N/A									
Weighted Average				#N/A					#N/A	#N/A		
Factor				1.00					1.00	1.00		
Indicator Score				#N/A						#N/A	#N/A	
Bridge Index									#N/A			
Segment 2												
N/A No Bridges in Segment		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		
Total			#N/A									
Weighted Average				#N/A					#N/A	#N/A		
Factor				1.00					1.00	1.00		
Indicator Score				#N/A						#N/A	#N/A	
Bridge Index									#N/A			
Segment 3												
N/A No Bridges in Segment		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		
Total			#N/A									
Weighted Average				#N/A					#N/A	#N/A		
Factor				1.00					1.00	1.00		
Indicator Score				#N/A						#N/A	#N/A	
Bridge Index									#N/A			
Segment 4												
N/A No Bridges in Segment		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		
Total			#N/A									
Weighted Average				#N/A					#N/A	#N/A		
Factor				1.00					1.00	1.00		
Indicator Score				#N/A						#N/A	#N/A	
Bridge Index									#N/A			
Segment 5												
Cameron Bridge NB	20015	466.88	3303	92.70	8.00	8.00	8.00	8.00	8.0	0		
Wash Bridge	696	467.48	619	69.20	7.00	7.00	7.00	5.00	5.0	0		
Five Mile Wash Br	697	471.43	533	67.10	6.00	6.00	6.00	6.00	6.0	533		
Bridge	580	476.22	591	81.70	6.00	6.00	7.00	5.00	5.0	0		
Moenkopi Wash Br	2452	477.12	868	98.50	6.00	8.00	8.00	8.00	6.0	0		
Bridge	581	480.26	387	66.80	6.00	6.00	6.00	5.00	5.0	0		
Total			6,302									
Weighted Average				86.40					6.80	8.46%		
Factor				1.00					1.00	1.00		
Indicator Score				86.40						8.46%	5	
Bridge Index									6.80			

Structure Name (A209)	Structure # (N8)	Milepost (A232)	Area (A225)	Bridge Sufficiency	Bridge Index					Functionally Obsolete Bridges	Bridge Rating	Hot Spots on Bridge Index map
				Sufficiency Rating	Deck (N58)	Sub (N59)	Super (N60)	Eval (N67)	Lowest	Deck Area on Func Obsolete		
Segment 6												
Wash Bridge	582	481.89	462	49.80	5.00	5.00	4.00	4.00	4.0	0		
Bridge	547	490.50	389	67.80	6.00	6.00	6.00	5.00	5.0	0		
Total			851									
Weighted Average				58.03					4.46	0.00%		
Factor				1.00					1.00	1.00		
Indicator Score				58.03						0.00%	4	
Bridge Index									4.46			
Segment 7												
Tanner Wash Bridge	1899	521.54	859	77.10	6.00	8.00	7.00	7.00	6.0	0		
Total			859									
Weighted Average				77.10					6.00	0.00%		
Factor				1.00					1.00	1.00		
Indicator Score				77.10						0.00%	6	
Bridge Index									6.00			
Segment 8												
Waterhole Canyon Br	508	542.00	504	73.10	7.00	7.00	7.00	6.00	6.0	0		
Total			504									
Weighted Average				73.10					6.00	0.00%		
Factor				1.00					1.00	1.00		
Indicator Score				73.10						0.00%	6	
Bridge Index									6.00			
Segment 9												
Glen Canyon Bridge	537	549.54	4841	67.70	6.00	6.00	6.00	6.00	6.0	0		
Total			4,841									
Weighted Average				67.70					6.00	0.00%		
Factor				1.00					1.00	1.00		
Indicator Score				67.70						0.00%	6	
Bridge Index									6.00			
Segment 10												
N/A No Bridges in Segment		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	0		
Total			#N/A									
Weighted Average				#N/A					#N/A	#N/A		
Factor				1.00					1.00	1.00		
Indicator Score				#N/A						#N/A	#N/A	
Bridge Index									#N/A			

Mobility Performance Area Data

Segment	Begin MP	End MP	Length (mi)	Facility Type	Flow Type	Terrain	No. of Lanes	Capacity Environment Type	Lane Width (feet)	Weighted Average Posted Speed Limit (mph)	Divided or Undivided	Access Points (per mile)	% No-Passing Zone	Street Parking
89U-1	420	428	8	Fringe Urban	Interrupted	Level	4	Urban/Rural Single or Multilane Signalized	12.00	54	Undivided	N/A	0%	N/A
89U-2	428	442	14	Rural	Uninterrupted	Rolling	4	Multilane Highway	12.00	65	Divided	1.43	0%	N/A
89U-3	442	457	15	Rural	Uninterrupted	Level	2	Rural Two-Lane, Non-Signalized	12.00	65	Undivided	1.07	25%	N/A
89U-4	457	465	8	Rural	Uninterrupted	Level	2	Rural Two-Lane, Non-Signalized	12.00	64	Undivided	3.38	63%	N/A
89U-5	465	481	16	Rural	Interrupted	Level	2	Rural Two-Lane, Non-Signalized	12.00	59	Undivided	1.63	54%	N/A
89U-6	481	498	17	Rural	Uninterrupted	Level	2	Rural Two-Lane, Non-Signalized	12.00	65	Undivided	1.12	27%	N/A
89U-7	498	524	26	Rural	Uninterrupted	Level	2	Rural Two-Lane, Non-Signalized	12.00	64	Undivided	2.69	46%	N/A
89U-8	524	547	23	Rural	Uninterrupted	Rolling	2	Rural Two-Lane, Non-Signalized	12.00	60	Undivided	1.30	41%	N/A
89U-9	547	550	3	Fringe Urban	Interrupted	Level	2	Rural Two-Lane, Non-Signalized	12.00	43	Undivided	3.33	88%	N/A
89U-10	550	557	7	Rural	Uninterrupted	Level	2	Rural Two-Lane, Non-Signalized	12.00	59	Undivided	1.71	59%	N/A

Car TTI and PTI/Truck TTTI and TPTI – Northbound

Segment	TMC	Time Period	Week Type	Road #	road direction	cars mean	trucks mean	cars P05	trucks P05	Posted Speed limit	Assumed car free-flow speed	Assumed truck free-flow speed	Cars TTI	Trucks TTI	Cars PTI	Trucks PTI	Cars PeakTTI	Trucks PeakTTI	Cars PeakPTI	Trucks PeakPTI
1	115P06478	1 AM Peak	Weekday	US-89	Northbound	36.4	32.6	13.7	7.5	45	45	45	1.24	1.38	3.29	6.03	1.28	1.42	4.02	6.03
1	115P06478	2 Mid Day	Weekday	US-89	Northbound	35.2	31.6	12.4	9.7	45	45	45	1.28	1.42	3.62	4.62				
1	115P06478	3 PM Peak	Weekday	US-89	Northbound	36.1	34.7	15.9	13.7	45	45	45	1.24	1.30	2.83	3.29				
1	115P06478	4 Evening	Weekday	US-89	Northbound	36.1	33.7	11.2	10.6	45	45	45	1.25	1.34	4.02	4.26				
1	115P06479	1 AM Peak	Weekday	US-89	Northbound	51.8	50.4	34.2	34.7	55	55	55	1.06	1.09	1.61	1.59	1.06	1.10	1.61	1.61
1	115P06479	2 Mid Day	Weekday	US-89	Northbound	52.3	50.6	34.8	35.7	55	55	55	1.05	1.09	1.58	1.54				
1	115P06479	3 PM Peak	Weekday	US-89	Northbound	51.8	50.0	35.2	34.2	55	55	55	1.06	1.10	1.56	1.61				
1	115P06479	4 Evening	Weekday	US-89	Northbound	52.4	51.5	36.7	39.7	55	55	55	1.05	1.07	1.50	1.38				
1	115P06480	1 AM Peak	Weekday	US-89	Northbound	53.7	53.0	34.2	39.4	55	55	55	1.02	1.04	1.61	1.40	1.07	1.04	1.81	1.40
1	115P06480	2 Mid Day	Weekday	US-89	Northbound	53.8	53.3	30.4	40.3	55	55	55	1.02	1.03	1.81	1.37				
1	115P06480	3 PM Peak	Weekday	US-89	Northbound	51.6	53.0	18.6	39.7	55	55	55	1.07	1.04		1.39				
1	115P06480	4 Evening	Weekday	US-89	Northbound	53.5	53.6	30.4	43.5	55	55	55	1.03	1.03	1.81	1.27				
1	115P06481	1 AM Peak	Weekday	US-89	Northbound	60.3	51.8	46.0	38.5	62	62	62	1.03	1.20	1.35	1.61	1.07	1.20	1.49	1.61
1	115P06481	2 Mid Day	Weekday	US-89	Northbound	60.8	52.3	47.0	40.2	62	62	62	1.02	1.18	1.32	1.54				
1	115P06481	3 PM Peak	Weekday	US-89	Northbound	59.9	52.4	44.1	40.0	62	62	62	1.04	1.18	1.41	1.55				
1	115P06481	4 Evening	Weekday	US-89	Northbound	57.9	51.8	41.6	39.3	62	62	62	1.07	1.20	1.49	1.58				
2	115P06481	1 AM Peak	Weekday	US-89	Northbound	60.3	51.8	46.0	38.5	62	62	62	1.03	1.20	1.35	1.61	1.07	1.20	1.49	1.61
2	115P06481	2 Mid Day	Weekday	US-89	Northbound	60.8	52.3	47.0	40.2	62	62	62	1.02	1.18	1.32	1.54				
2	115P06481	3 PM Peak	Weekday	US-89	Northbound	59.9	52.4	44.1	40.0	62	62	62	1.04	1.18	1.41	1.55				
2	115P06481	4 Evening	Weekday	US-89	Northbound	57.9	51.8	41.6	39.3	62	62	62	1.07	1.20	1.49	1.58				
2	115P06482	1 AM Peak	Weekday	US-89	Northbound	68.6	60.9	60.7	51.8	65	65	65	1.00	1.07	1.07	1.26	1.00	1.08	1.14	1.31
2	115P06482	2 Mid Day	Weekday	US-89	Northbound	69.1	61.5	61.0	54.7	65	65	65	1.00	1.06	1.06	1.19				
2	115P06482	3 PM Peak	Weekday	US-89	Northbound	68.5	61.4	60.0	54.7	65	65	65	1.00	1.06	1.08	1.19				
2	115P06482	4 Evening	Weekday	US-89	Northbound	67.3	60.1	56.8	49.7	65	65	65	1.00	1.08	1.14	1.31				
2	115P06483	1 AM Peak	Weekday	US-89	Northbound	69.2	63.7	62.7	57.6	65	65	65	1.00	1.02	1.04	1.13	1.00	1.03	1.08	1.22
2	115P06483	2 Mid Day	Weekday	US-89	Northbound	69.1	63.2	60.9	53.5	65	65	65	1.00	1.03	1.07	1.22				
2	115P06483	3 PM Peak	Weekday	US-89	Northbound	69.2	64.1	62.1	58.1	65	65	65	1.00	1.01	1.05	1.12				
2	115P06483	4 Evening	Weekday	US-89	Northbound	67.7	62.9	60.3	55.5	65	65	65	1.00	1.03	1.08	1.17				
3	115P06483	1 AM Peak	Weekday	US-89	Northbound	69.2	63.7	62.7	57.6	65	65	65	1.00	1.02	1.04	1.13	1.00	1.03	1.08	1.22
3	115P06483	2 Mid Day	Weekday	US-89	Northbound	69.1	63.2	60.9	53.5	65	65	65	1.00	1.03	1.07	1.22				
3	115P06483	3 PM Peak	Weekday	US-89	Northbound	69.2	64.1	62.1	58.1	65	65	65	1.00	1.01	1.05	1.12				
3	115P06483	4 Evening	Weekday	US-89	Northbound	67.7	62.9	60.3	55.5	65	65	65	1.00	1.03	1.08	1.17				
3	115P06484	1 AM Peak	Weekday	US-89	Northbound	67.4	61.9	57.8	53.4	65	65	65	1.00	1.05	1.13	1.22	1.00	1.06	1.20	1.23
3	115P06484	2 Mid Day	Weekday	US-89	Northbound	67.2	62.2	56.5	55.0	65	65	65	1.00	1.05	1.15	1.18				
3	115P06484	3 PM Peak	Weekday	US-89	Northbound	66.9	62.5	56.4	55.5	65	65	65	1.00	1.04	1.15	1.17				
3	115P06484	4 Evening	Weekday	US-89	Northbound	65.7	61.5	54.2	53.1	65	65	65	1.00	1.06	1.20	1.23				
4	115P06485	1 AM Peak	Weekday	US-89	Northbound	64.7	59.6	51.3	43.5	65	65	65	1.00	1.09	1.27	1.49	1.03	1.11	1.39	1.67

Segment	TMC	Time Period	Week Type	Road #	road direction	cars mean	trucks mean	cars P05	trucks P05	Posted Speed limit	Assumed car free-flow speed	Assumed truck free-flow speed	Cars TTI	Trucks TTI	Cars PTI	Trucks PTI	Cars PeakTTI	Trucks PeakTTI	Cars PeakPTI	Trucks PeakPTI
4	115P06485	2 Mid Day	Weekday	US-89	Northbound	64.0	60.4	50.9	46.8	65	65	65	1.02	1.08	1.28	1.39				
4	115P06485	3 PM Peak	Weekday	US-89	Northbound	64.2	60.7	51.5	48.5	65	65	65	1.01	1.07	1.26	1.34				
4	115P06485	4 Evening	Weekday	US-89	Northbound	63.1	58.7	46.6	38.8	65	65	65	1.03	1.11	1.39	1.67				
4	115P05873	1 AM Peak	Weekday	US-89	Northbound	56.9	49.2	24.9	17.4	65	65	65	1.14	1.32	2.61	3.73	1.20	1.33	3.37	3.73
4	115P05873	2 Mid Day	Weekday	US-89	Northbound	55.1	49.8	19.3	18.7	65	65	65	1.18	1.31	3.37	3.48				
4	115P05873	3 PM Peak	Weekday	US-89	Northbound	56.3	51.0	19.9	22.6	65	65	65	1.15	1.27	3.27	2.87				
4	115P05873	4 Evening	Weekday	US-89	Northbound	54.3	48.7	19.9	17.4	65	65	65	1.20	1.33	3.27	3.73				
5	115P06486	1 AM Peak	Weekday	US-89	Northbound	42.2	41.9	10.6	25.9	50	50	50	1.18	1.19		1.93	1.19	1.20	2.18	2.00
5	115P06486	2 Mid Day	Weekday	US-89	Northbound	42.1	41.6	9.6	25.1	50	50	50	1.19	1.20		2.00				
5	115P06486	3 PM Peak	Weekday	US-89	Northbound	45.2	43.1	22.9	29.7	50	50	50	1.11	1.16	2.18	1.68				
5	115P06486	4 Evening	Weekday	US-89	Northbound	45.6	42.9	30.9	30.3	50	50	50	1.10	1.17	1.62	1.65				
5	115P05874	1 AM Peak	Weekday	US-89	Northbound	64.7	61.2	53.4	52.8	65	65	65	1.00	1.06	1.22	1.23	1.02	1.08	1.29	1.30
5	115P05874	2 Mid Day	Weekday	US-89	Northbound	63.7	60.4	50.2	50.0	65	65	65	1.02	1.08	1.29	1.30				
5	115P05874	3 PM Peak	Weekday	US-89	Northbound	64.9	61.1	54.5	52.9	65	65	65	1.00	1.06	1.19	1.23				
5	115P05874	4 Evening	Weekday	US-89	Northbound	64.1	60.4	52.4	50.7	65	65	65	1.01	1.08	1.24	1.28				
6	115P06487	1 AM Peak	Weekday	US-89	Northbound	64.6	61.7	52.2	54.1	65	65	65	1.01	1.05	1.24	1.20	1.02	1.06	1.32	1.23
6	115P06487	2 Mid Day	Weekday	US-89	Northbound	64.4	61.5	51.4	53.4	65	65	65	1.01	1.06	1.26	1.22				
6	115P06487	3 PM Peak	Weekday	US-89	Northbound	64.3	61.8	49.3	54.1	65	65	65	1.01	1.05	1.32	1.20				
6	115P06487	4 Evening	Weekday	US-89	Northbound	64.0	61.1	51.2	52.8	65	65	65	1.02	1.06	1.27	1.23				
6	115P06488	1 AM Peak	Weekday	US-89	Northbound	67.2	63.0	61.6	56.9	65	65	65	1.00	1.03	1.05	1.14	1.00	1.04	1.14	1.14
6	115P06488	2 Mid Day	Weekday	US-89	Northbound	66.7	62.6	56.9	56.9	65	65	65	1.00	1.04	1.14	1.14				
6	115P06488	3 PM Peak	Weekday	US-89	Northbound	66.8	63.0	56.9	56.9	65	65	65	1.00	1.03	1.14	1.14				
6	115P06488	4 Evening	Weekday	US-89	Northbound	66.3	62.4	56.9	56.9	65	65	65	1.00	1.04	1.14	1.14				
6	115P06489	1 AM Peak	Weekday	US-89	Northbound	64.0	59.6	48.7	44.7	65	65	65	1.01	1.09	1.33	1.45	1.07	1.11	2.05	1.49
6	115P06489	2 Mid Day	Weekday	US-89	Northbound	62.7	60.1	41.6	49.7	65	65	65	1.04	1.08	1.56	1.31				
6	115P06489	3 PM Peak	Weekday	US-89	Northbound	62.3	60.3	38.2	49.7	65	65	65	1.04	1.08	1.70	1.31				
6	115P06489	4 Evening	Weekday	US-89	Northbound	61.0	58.7	31.7	43.5	65	65	65	1.07	1.11	2.05	1.49				
7	115P06490	1 AM Peak	Weekday	US-89	Northbound	63.2	58.2	47.8	43.5	60	60	60	1.00	1.03	1.25	1.38	1.00	1.05	1.66	1.41
7	115P06490	2 Mid Day	Weekday	US-89	Northbound	63.3	58.3	47.8	46.0	60	60	60	1.00	1.03	1.25	1.31				
7	115P06490	3 PM Peak	Weekday	US-89	Northbound	62.8	58.5	47.8	46.6	60	60	60	1.00	1.03	1.25	1.29				
7	115P06490	4 Evening	Weekday	US-89	Northbound	60.1	57.3	36.2	42.7	60	60	60	1.00	1.05	1.66	1.41				
7	115P06671	1 AM Peak	Weekday	US-89	Northbound	67.3	62.8	60.9	58.2	65	65	65	1.00	1.03	1.07	1.12	1.00	1.04	1.14	1.16
7	115P06671	2 Mid Day	Weekday	US-89	Northbound	67.4	62.8	59.7	57.8	65	65	65	1.00	1.04	1.09	1.12				
7	115P06671	3 PM Peak	Weekday	US-89	Northbound	67.5	63.1	59.1	58.2	65	65	65	1.00	1.03	1.10	1.12				
7	115P06671	4 Evening	Weekday	US-89	Northbound	66.3	62.2	57.1	56.0	65	65	65	1.00	1.04	1.14	1.16				
7	115P05875	1 AM Peak	Weekday	US-89	Northbound	59.1	55.4	41.5	33.5	58	58	58	1.00	1.05	1.40	1.73	1.03	1.07	1.80	1.73
7	115P05875	2 Mid Day	Weekday	US-89	Northbound	58.1	56.0	38.9	38.3	58	58	58	1.00	1.04	1.49	1.52				
7	115P05875	3 PM Peak	Weekday	US-89	Northbound	57.5	55.7	33.5	36.5	58	58	58	1.01	1.04	1.73	1.59				
7	115P05875	4 Evening	Weekday	US-89	Northbound	56.4	54.3	32.2	39.5	58	58	58	1.03	1.07	1.80	1.47				

Segment	TMC	Time Period	Week Type	Road #	road direction	cars mean	trucks mean	cars P05	trucks P05	Posted Speed limit	Assumed car free-flow speed	Assumed truck free-flow speed	Cars TTI	Trucks TTI	Cars PTI	Trucks PTI	Cars PeakTTI	Trucks PeakTTI	Cars PeakPTI	Trucks PeakPTI
8	115P06491	1 AM Peak	Weekday	US-89	Northbound	51.9	44.2	31.7	26.6	55	55	55	1.06	1.24	1.73	2.06	1.12	1.24	2.06	2.06
8	115P06491	2 Mid Day	Weekday	US-89	Northbound	51.0	44.5	26.7	27.6	55	55	55	1.08	1.24	2.06	1.99				
8	115P06491	3 PM Peak	Weekday	US-89	Northbound	51.0	44.9	27.4	28.6	55	55	55	1.08	1.22	2.01	1.92				
8	115P06491	4 Evening	Weekday	US-89	Northbound	49.2	44.2	26.7	28.1	55	55	55	1.12	1.24	2.06	1.96				
8	115P06492	1 AM Peak	Weekday	US-89	Northbound	66.4	62.9	58.4	56.6	65	65	65	1.00	1.03	1.11	1.15	1.00	1.05	1.14	1.22
8	115P06492	2 Mid Day	Weekday	US-89	Northbound	66.5	62.5	57.6	55.4	65	65	65	1.00	1.04	1.13	1.17				
8	115P06492	3 PM Peak	Weekday	US-89	Northbound	66.8	63.4	57.8	57.0	65	65	65	1.00	1.03	1.12	1.14				
8	115P06492	4 Evening	Weekday	US-89	Northbound	66.7	62.0	57.0	53.4	65	65	65	1.00	1.05	1.14	1.22				
8	115P06493	1 AM Peak	Weekday	US-89	Northbound	59.6	57.0	43.5	43.8	65	65	65	1.09	1.14	1.49	1.48	1.15	1.15	1.67	1.51
8	115P06493	2 Mid Day	Weekday	US-89	Northbound	57.1	56.3	39.0	43.5	65	65	65	1.14	1.15	1.67	1.49				
8	115P06493	3 PM Peak	Weekday	US-89	Northbound	56.6	56.8	40.4	44.3	65	65	65	1.15	1.14	1.61	1.47				
8	115P06493	4 Evening	Weekday	US-89	Northbound	58.5	56.4	41.7	43.2	65	65	65	1.11	1.15	1.56	1.51				
8	115P06494	1 AM Peak	Weekday	US-89	Northbound	34.3	31.9	8.7	10.2	50	50	50	1.46	1.57	5.75	4.89	1.57	1.65	5.89	5.75
8	115P06494	2 Mid Day	Weekday	US-89	Northbound	32.8	31.2	8.5	8.7	50	50	50	1.52	1.60	5.89	5.75				
8	115P06494	3 PM Peak	Weekday	US-89	Northbound	32.7	30.4	10.0	8.7	50	50	50	1.53	1.65	5.02	5.75				
8	115P06494	4 Evening	Weekday	US-89	Northbound	31.9	30.4	9.3	10.0	50	50	50	1.57	1.64	5.40	5.02				
9	115P05876	1 AM Peak	Weekday	US-89	Northbound	42.9	44.6	28.2	35.2	45	45	45	1.05	1.01	1.59	1.28	1.05	1.06	1.59	1.46
9	115P05876	2 Mid Day	Weekday	US-89	Northbound	43.4	44.5	29.2	35.4	45	45	45	1.04	1.01	1.54	1.27				
9	115P05876	3 PM Peak	Weekday	US-89	Northbound	43.6	44.3	29.9	35.4	45	45	45	1.03	1.02	1.50	1.27				
9	115P05876	4 Evening	Weekday	US-89	Northbound	42.8	42.7	29.7	30.9	45	45	45	1.05	1.06	1.51	1.46				
9	115P06495	1 AM Peak	Weekday	US-89	Northbound	29.3	25.9	13.7	11.8	45	45	45	1.54	1.74	3.28	3.80	1.59	1.82	3.63	5.42
9	115P06495	2 Mid Day	Weekday	US-89	Northbound	29.1	26.5	12.4	9.5	45	45	45	1.55	1.70	3.63	4.72				
9	115P06495	3 PM Peak	Weekday	US-89	Northbound	30.0	26.4	13.7	10.1	45	45	45	1.50	1.70	3.28	4.46				
9	115P06495	4 Evening	Weekday	US-89	Northbound	28.2	24.7	13.0	8.3	45	45	45	1.59	1.82	3.45	5.42				
9	115P06496	1 AM Peak	Weekday	US-89	Northbound	40.7	40.4	15.5	18.7	50	50	50	1.23	1.24	3.22	2.68	1.25	1.32	3.35	2.68
9	115P06496	2 Mid Day	Weekday	US-89	Northbound	39.9	37.8	9.6	10.6	50	50	50	1.25	1.32						
9	115P06496	3 PM Peak	Weekday	US-89	Northbound	41.2	42.4	14.9	24.8	50	50	50	1.21	1.18	3.35	2.01				
9	115P06496	4 Evening	Weekday	US-89	Northbound	43.9	42.4	23.6	25.3	50	50	50	1.14	1.18	2.12	1.98				
10	115P06496	1 AM Peak	Weekday	US-89	Northbound	40.7	40.4	15.5	18.7	50	50	50	1.23	1.24	3.22	2.68	1.25	1.32	3.35	2.68
10	115P06496	2 Mid Day	Weekday	US-89	Northbound	39.9	37.8	9.6	10.6	50	50	50	1.25	1.32						
10	115P06496	3 PM Peak	Weekday	US-89	Northbound	41.2	42.4	14.9	24.8	50	50	50	1.21	1.18	3.35	2.01				
10	115P06496	4 Evening	Weekday	US-89	Northbound	43.9	42.4	23.6	25.3	50	50	50	1.14	1.18	2.12	1.98				
10	115P06497	1 AM Peak	Weekday	US-89	Northbound	60.0	59.8	44.8	49.8	65	65	65	1.08	1.09	1.45	1.31	1.08	1.09	1.45	1.34
10	115P06497	2 Mid Day	Weekday	US-89	Northbound	60.6	60.2	44.8	50.9	65	65	65	1.07	1.08	1.45	1.28				
10	115P06497	3 PM Peak	Weekday	US-89	Northbound	60.7	60.3	46.6	51.4	65	65	65	1.07	1.08	1.39	1.27				
10	115P06497	4 Evening	Weekday	US-89	Northbound	60.8	59.6	48.5	48.7	65	65	65	1.07	1.09	1.34	1.34				

Car TTI and PTI/Truck TTTI and TPTI – Southbound

Segment	TMC	Time Period	Week Type	Road #	road direction	cars mean	trucks mean	cars P05	trucks P05	Posted Speed limit	Assumed car free-flow speed	Assumed truck free-flow speed	Cars TTI	Trucks TTI	Cars PTI	Trucks PTI	Cars PeakTTI	Trucks PeakTTI	Cars PeakPTI	Trucks PeakPTI
1	115N06477	1 AM Peak	Weekday	US-89	Southbound	37.5	33.5	17.4	12.4	45	45	45	1.20	1.34	2.59	3.62	1.23	1.34	3.13	3.62
1	115N06477	2 Mid Day	Weekday	US-89	Southbound	36.6	34.3	14.4	13.7	45	45	45	1.23	1.31	3.13	3.28				
1	115N06477	3 PM Peak	Weekday	US-89	Southbound	36.8	35.1	14.7	14.9	45	45	45	1.22	1.28	3.06	3.02				
1	115N06477	4 Evening	Weekday	US-89	Southbound	38.1	34.8	15.5	12.4	45	45	45	1.18	1.29	2.90	3.62				
1	115N06478	1 AM Peak	Weekday	US-89	Southbound	49.0	46.1	28.6	26.7	55	55	55	1.12	1.19	1.93	2.06	1.12	1.19	1.93	2.06
1	115N06478	2 Mid Day	Weekday	US-89	Southbound	49.2	47.0	30.5	30.1	55	55	55	1.12	1.17	1.81	1.83				
1	115N06478	3 PM Peak	Weekday	US-89	Southbound	49.6	47.6	33.5	34.2	55	55	55	1.11	1.15	1.64	1.61				
1	115N06478	4 Evening	Weekday	US-89	Southbound	49.6	47.7	34.7	36.0	55	55	55	1.11	1.15	1.59	1.53				
1	115N06479	1 AM Peak	Weekday	US-89	Southbound	50.4	51.7	19.3	36.6	55	55	55	1.09	1.06	2.86	1.50	1.09	1.06	2.86	1.50
1	115N06479	2 Mid Day	Weekday	US-89	Southbound	52.6	52.6	27.4	40.3	55	55	55	1.05	1.04	2.01	1.37				
1	115N06479	3 PM Peak	Weekday	US-89	Southbound	52.9	52.7	30.4	41.6	55	55	55	1.04	1.04	1.81	1.32				
1	115N06479	4 Evening	Weekday	US-89	Southbound	52.8	52.0	29.2	38.6	55	55	55	1.04	1.06	1.88	1.43				
1	115N06480	1 AM Peak	Weekday	US-89	Southbound	62.4	59.2	48.1	51.0	60	60	60	1.00	1.01	1.25	1.18	1.00	1.02	1.25	1.24
1	115N06480	2 Mid Day	Weekday	US-89	Southbound	63.9	59.7	53.4	51.9	60	60	60	1.00	1.01	1.12	1.16				
1	115N06480	3 PM Peak	Weekday	US-89	Southbound	64.2	59.8	52.8	52.5	60	60	60	1.00	1.00	1.14	1.14				
1	115N06480	4 Evening	Weekday	US-89	Southbound	63.1	58.7	51.6	48.4	60	60	60	1.00	1.02	1.16	1.24				
2	115N06480	1 AM Peak	Weekday	US-89	Southbound	62.4	59.2	48.1	51.0	60	60	60	1.00	1.01	1.25	1.18	1.00	1.02	1.25	1.24
2	115N06480	2 Mid Day	Weekday	US-89	Southbound	63.9	59.7	53.4	51.9	60	60	60	1.00	1.01	1.12	1.16				
2	115N06480	3 PM Peak	Weekday	US-89	Southbound	64.2	59.8	52.8	52.5	60	60	60	1.00	1.00	1.14	1.14				
2	115N06480	4 Evening	Weekday	US-89	Southbound	63.1	58.7	51.6	48.4	60	60	60	1.00	1.02	1.16	1.24				
2	115N06481	1 AM Peak	Weekday	US-89	Southbound	62.9	50.9	38.2	34.2	65	65	65	1.03	1.28	1.70	1.90	1.07	1.30	1.74	1.97
2	115N06481	2 Mid Day	Weekday	US-89	Southbound	63.0	50.1	39.5	32.9	65	65	65	1.03	1.30	1.65	1.97				
2	115N06481	3 PM Peak	Weekday	US-89	Southbound	64.0	50.8	41.9	33.6	65	65	65	1.02	1.28	1.55	1.94				
2	115N06481	4 Evening	Weekday	US-89	Southbound	61.0	50.5	37.3	32.9	65	65	65	1.07	1.29	1.74	1.97				
2	115N06482	1 AM Peak	Weekday	US-89	Southbound	66.4	57.0	54.1	46.9	65	65	65	1.00	1.14	1.20	1.39	1.01	1.15	1.28	1.52
2	115N06482	2 Mid Day	Weekday	US-89	Southbound	66.1	56.4	53.9	42.7	65	65	65	1.00	1.15	1.21	1.52				
2	115N06482	3 PM Peak	Weekday	US-89	Southbound	66.9	57.0	55.7	46.0	65	65	65	1.00	1.14	1.17	1.41				
2	115N06482	4 Evening	Weekday	US-89	Southbound	64.2	57.1	50.9	46.6	65	65	65	1.01	1.14	1.28	1.39				
3	115N06482	1 AM Peak	Weekday	US-89	Southbound	66.4	57.0	54.1	46.9	65	65	65	1.00	1.14	1.20	1.39	1.01	1.15	1.28	1.52
3	115N06482	2 Mid Day	Weekday	US-89	Southbound	66.1	56.4	53.9	42.7	65	65	65	1.00	1.15	1.21	1.52				
3	115N06482	3 PM Peak	Weekday	US-89	Southbound	66.9	57.0	55.7	46.0	65	65	65	1.00	1.14	1.17	1.41				
3	115N06482	4 Evening	Weekday	US-89	Southbound	64.2	57.1	50.9	46.6	65	65	65	1.01	1.14	1.28	1.39				
3	115N06483	1 AM Peak	Weekday	US-89	Southbound	66.4	60.6	55.2	51.6	65	65	65	1.00	1.07	1.18	1.26	1.01	1.07	1.23	1.28
3	115N06483	2 Mid Day	Weekday	US-89	Southbound	65.5	60.8	53.9	52.4	65	65	65	1.00	1.07	1.21	1.24				
3	115N06483	3 PM Peak	Weekday	US-89	Southbound	65.9	61.1	55.8	53.6	65	65	65	1.00	1.06	1.16	1.21				
3	115N06483	4 Evening	Weekday	US-89	Southbound	64.6	60.6	52.8	50.9	65	65	65	1.01	1.07	1.23	1.28				
4	115N06484	1 AM Peak	Weekday	US-89	Southbound	62.1	50.3	42.3	35.9	65	65	65	1.05	1.29	1.54	1.81	1.13	1.30	1.77	1.94

Segment	TMC	Time Period	Week Type	Road #	road direction	cars mean	trucks mean	cars P05	trucks P05	Posted Speed limit	Assumed car free-flow speed	Assumed truck free-flow speed	Cars TTI	Trucks TTI	Cars PTI	Trucks PTI	Cars PeakTTI	Trucks PeakTTI	Cars PeakPTI	Trucks PeakPTI
4	115N06484	2 Mid Day	Weekday	US-89	Southbound	61.9	50.3	44.8	35.1	65	65	65	1.05	1.29	1.45	1.85				
4	115N06484	3 PM Peak	Weekday	US-89	Southbound	61.0	50.4	42.5	34.8	65	65	65	1.07	1.29	1.53	1.87				
4	115N06484	4 Evening	Weekday	US-89	Southbound	57.6	49.8	36.7	33.6	65	65	65	1.13	1.30	1.77	1.94				
4	115N06485	1 AM Peak	Weekday	US-89	Southbound	57.7	49.7	29.2	23.6	65	65	65	1.13	1.31	2.23	2.75	1.20	1.34	2.55	3.14
4	115N06485	2 Mid Day	Weekday	US-89	Southbound	56.3	50.6	28.5	24.9	65	65	65	1.16	1.29	2.28	2.61				
4	115N06485	3 PM Peak	Weekday	US-89	Southbound	56.2	51.1	30.4	28.0	65	65	65	1.16	1.27	2.14	2.32				
4	115N06485	4 Evening	Weekday	US-89	Southbound	53.9	48.4	25.5	20.7	65	65	65	1.20	1.34	2.55	3.14				
5	115N06486	1 AM Peak	Weekday	US-89	Southbound	65.2	59.7	49.7	44.0	65	65	65	1.00	1.09	1.31	1.48	1.02	1.09	1.36	1.48
5	115N06486	2 Mid Day	Weekday	US-89	Southbound	63.6	59.8	47.9	46.6	65	65	65	1.02	1.09	1.36	1.39				
5	115N06486	3 PM Peak	Weekday	US-89	Southbound	64.9	61.2	53.1	52.3	65	65	65	1.00	1.06	1.22	1.24				
5	115N06486	4 Evening	Weekday	US-89	Southbound	64.0	60.9	51.6	50.0	65	65	65	1.02	1.07	1.26	1.30				
5	115N05873	1 AM Peak	Weekday	US-89	Southbound	41.5	39.3	7.5	20.3	50	50	50	1.21	1.27		2.46	1.24	1.30	2.78	2.50
5	115N05873	2 Mid Day	Weekday	US-89	Southbound	40.3	39.1	10.0	20.0	50	50	50	1.24	1.28		2.50				
5	115N05873	3 PM Peak	Weekday	US-89	Southbound	42.4	40.2	18.0	23.0	50	50	50	1.18	1.24	2.78	2.17				
5	115N05873	4 Evening	Weekday	US-89	Southbound	42.2	38.3	21.9	20.7	50	50	50	1.19	1.30	2.28	2.42				
6	115N05874	1 AM Peak	Weekday	US-89	Southbound	66.5	62.0	51.6	54.7	65	65	65	1.00	1.05	1.26	1.19	1.00	1.05	1.26	1.19
6	115N05874	2 Mid Day	Weekday	US-89	Southbound	65.7	62.4	55.1	55.9	65	65	65	1.00	1.04	1.18	1.16				
6	115N05874	3 PM Peak	Weekday	US-89	Southbound	66.2	62.7	55.8	56.2	65	65	65	1.00	1.04	1.16	1.16				
6	115N05874	4 Evening	Weekday	US-89	Southbound	65.6	62.3	55.4	54.6	65	65	65	1.00	1.04	1.17	1.19				
6	115N06487	1 AM Peak	Weekday	US-89	Southbound	68.6	63.7	59.2	59.2	65	65	65	1.00	1.02	1.10	1.10	1.00	1.03	1.14	1.14
6	115N06487	2 Mid Day	Weekday	US-89	Southbound	67.9	63.6	59.2	56.9	65	65	65	1.00	1.02	1.10	1.14				
6	115N06487	3 PM Peak	Weekday	US-89	Southbound	68.6	64.0	61.6	59.2	65	65	65	1.00	1.02	1.05	1.10				
6	115N06487	4 Evening	Weekday	US-89	Southbound	67.0	63.2	56.9	56.9	65	65	65	1.00	1.03	1.14	1.14				
6	115N06488	1 AM Peak	Weekday	US-89	Southbound	65.0	59.6	45.7	41.6	65	65	65	1.00	1.09	1.42	1.56	1.03	1.09	1.43	1.56
6	115N06488	2 Mid Day	Weekday	US-89	Southbound	64.3	60.4	47.2	46.6	65	65	65	1.01	1.08	1.38	1.39				
6	115N06488	3 PM Peak	Weekday	US-89	Southbound	65.0	61.3	50.0	51.0	65	65	65	1.00	1.06	1.30	1.27				
6	115N06488	4 Evening	Weekday	US-89	Southbound	63.2	59.7	45.5	43.9	65	65	65	1.03	1.09	1.43	1.48				
7	115N06489	1 AM Peak	Weekday	US-89	Southbound	66.2	61.7	51.0	50.9	60	60	60	1.00	1.00	1.18	1.18	1.00	1.00	1.27	1.24
7	115N06489	2 Mid Day	Weekday	US-89	Southbound	65.6	62.2	51.3	52.2	60	60	60	1.00	1.00	1.17	1.15				
7	115N06489	3 PM Peak	Weekday	US-89	Southbound	66.1	62.7	51.6	53.5	60	60	60	1.00	1.00	1.16	1.12				
7	115N06489	4 Evening	Weekday	US-89	Southbound	64.5	61.3	47.4	48.5	60	60	60	1.00	1.00	1.27	1.24				
7	115N06490	1 AM Peak	Weekday	US-89	Southbound	65.3	61.6	54.6	54.7	65	65	65	1.00	1.06	1.19	1.19	1.01	1.06	1.22	1.23
7	115N06490	2 Mid Day	Weekday	US-89	Southbound	66.1	62.1	58.2	56.5	65	65	65	1.00	1.05	1.12	1.15				
7	115N06490	3 PM Peak	Weekday	US-89	Southbound	66.6	62.8	58.4	57.8	65	65	65	1.00	1.04	1.11	1.12				
7	115N06490	4 Evening	Weekday	US-89	Southbound	64.3	61.4	53.5	52.8	65	65	65	1.01	1.06	1.22	1.23				
7	115N06671	1 AM Peak	Weekday	US-89	Southbound	53.7	52.8	30.6	38.3	58	58	58	1.08	1.10	1.89	1.52	1.15	1.14	2.32	1.75
7	115N06671	2 Mid Day	Weekday	US-89	Southbound	53.8	52.4	33.1	33.1	58	58	58	1.08	1.11	1.75	1.75				
7	115N06671	3 PM Peak	Weekday	US-89	Southbound	53.8	52.9	32.2	33.5	58	58	58	1.08	1.10	1.80	1.73				
7	115N06671	4 Evening	Weekday	US-89	Southbound	50.5	50.7	25.0	35.0	58	58	58	1.15	1.14	2.32	1.66				

Segment	TMC	Time Period	Week Type	Road #	road direction	cars mean	trucks mean	cars P05	trucks P05	Posted Speed limit	Assumed car free-flow speed	Assumed truck free-flow speed	Cars TTI	Trucks TTI	Cars PTI	Trucks PTI	Cars PeakTTI	Trucks PeakTTI	Cars PeakPTI	Trucks PeakPTI
8	115N05875	1 AM Peak	Weekday	US-89	Southbound	50.7	46.1	29.2	26.7	55	55	55	1.08	1.19	1.88	2.06	1.13	1.20	3.54	2.10
8	115N05875	2 Mid Day	Weekday	US-89	Southbound	49.7	46.0	15.5	26.2	55	55	55	1.11	1.20	3.54	2.10				
8	115N05875	3 PM Peak	Weekday	US-89	Southbound	49.8	46.8	23.0	29.4	55	55	55	1.10	1.18	2.39	1.87				
8	115N05875	4 Evening	Weekday	US-89	Southbound	48.5	45.8	25.1	28.0	55	55	55	1.13	1.20	2.19	1.97				
8	115N06491	1 AM Peak	Weekday	US-89	Southbound	62.7	57.8	47.8	48.5	65	65	65	1.04	1.12	1.36	1.34	1.06	1.13	1.36	1.39
8	115N06491	2 Mid Day	Weekday	US-89	Southbound	63.6	58.4	52.6	48.8	65	65	65	1.02	1.11	1.24	1.33				
8	115N06491	3 PM Peak	Weekday	US-89	Southbound	63.6	58.7	51.5	48.8	65	65	65	1.02	1.11	1.26	1.33				
8	115N06491	4 Evening	Weekday	US-89	Southbound	61.4	57.5	47.8	46.6	65	65	65	1.06	1.13	1.36	1.39				
8	115N06492	1 AM Peak	Weekday	US-89	Southbound	53.3	50.0	30.7	34.0	62	62	62	1.16	1.24	2.02	1.83	1.17	1.24	2.02	1.84
8	115N06492	2 Mid Day	Weekday	US-89	Southbound	54.9	50.2	33.6	33.8	62	62	62	1.13	1.23	1.85	1.84				
8	115N06492	3 PM Peak	Weekday	US-89	Southbound	53.0	50.8	31.9	34.6	62	62	62	1.17	1.22	1.94	1.79				
8	115N06492	4 Evening	Weekday	US-89	Southbound	52.8	50.3	31.8	33.9	62	62	62	1.17	1.23	1.95	1.83				
8	115N06493	1 AM Peak	Weekday	US-89	Southbound	37.4	33.3	15.6	14.7	55	55	55	1.47	1.65	3.53	3.74	1.55	1.65	4.75	3.74
8	115N06493	2 Mid Day	Weekday	US-89	Southbound	38.8	34.1	15.7	15.3	55	55	55	1.42	1.61	3.50	3.60				
8	115N06493	3 PM Peak	Weekday	US-89	Southbound	38.5	33.9	15.8	14.7	55	55	55	1.43	1.62	3.47	3.74				
8	115N06493	4 Evening	Weekday	US-89	Southbound	35.4	33.6	11.6	15.3	55	55	55	1.55	1.64	4.75	3.60				
9	115N05876	1 AM Peak	Weekday	US-89	Southbound	40.3	40.6	19.0	18.2	50	50	50	1.24	1.23	2.63	2.74	1.25	1.23	3.22	2.74
9	115N05876	2 Mid Day	Weekday	US-89	Southbound	40.7	41.0	15.5	22.1	50	50	50	1.23	1.22	3.22	2.27				
9	115N05876	3 PM Peak	Weekday	US-89	Southbound	39.9	41.6	6.7	21.8	50	50	50	1.25	1.20		2.29				
9	115N05876	4 Evening	Weekday	US-89	Southbound	41.5	41.0	19.9	20.8	50	50	50	1.20	1.22	2.51	2.40				
9	115N06494	1 AM Peak	Weekday	US-89	Southbound	27.2	23.4	11.1	6.9	45	45	45	1.66	1.92	4.06	6.57	1.77	1.97	4.53	8.05
9	115N06494	2 Mid Day	Weekday	US-89	Southbound	25.8	23.3	9.9	6.9	45	45	45	1.74	1.93	4.53	6.57				
9	115N06494	3 PM Peak	Weekday	US-89	Southbound	25.5	22.9	10.0	5.6	45	45	45	1.76	1.97	4.49	8.05				
9	115N06494	4 Evening	Weekday	US-89	Southbound	25.4	23.4	10.7	7.3	45	45	45	1.77	1.92	4.22	6.14				
9	115N06495	1 AM Peak	Weekday	US-89	Southbound	41.0	41.6	25.8	33.0	45	45	45	1.10	1.08	1.74	1.36	1.11	1.10	1.74	1.46
9	115N06495	2 Mid Day	Weekday	US-89	Southbound	41.6	42.0	28.0	33.0	45	45	45	1.08	1.07	1.61	1.36				
9	115N06495	3 PM Peak	Weekday	US-89	Southbound	41.9	42.0	29.4	34.2	45	45	45	1.07	1.07	1.53	1.32				
9	115N06495	4 Evening	Weekday	US-89	Southbound	40.5	40.9	27.0	30.8	45	45	45	1.11	1.10	1.66	1.46				
10	115N05876	1 AM Peak	Weekday	US-89	Southbound	40.3	40.6	19.0	18.2	50	50	50	1.24	1.23	2.63	2.74	1.25	1.23	3.22	2.74
10	115N05876	2 Mid Day	Weekday	US-89	Southbound	40.7	41.0	15.5	22.1	50	50	50	1.23	1.22	3.22	2.27				
10	115N05876	3 PM Peak	Weekday	US-89	Southbound	39.9	41.6	6.7	21.8	50	50	50	1.25	1.20		2.29				
10	115N05876	4 Evening	Weekday	US-89	Southbound	41.5	41.0	19.9	20.8	50	50	50	1.20	1.22	2.51	2.40				
10	115N06496	1 AM Peak	Weekday	US-89	Southbound	60.7	58.0	40.1	42.9	65	65	65	1.07	1.12	1.62	1.52	1.10	1.14	1.63	1.53
10	115N06496	2 Mid Day	Weekday	US-89	Southbound	60.2	57.8	41.9	44.0	65	65	65	1.08	1.13	1.55	1.48				
10	115N06496	3 PM Peak	Weekday	US-89	Southbound	60.3	58.8	44.4	46.6	65	65	65	1.08	1.11	1.46	1.39				
10	115N06496	4 Evening	Weekday	US-89	Southbound	58.9	56.9	39.8	42.5	65	65	65	1.10	1.14	1.63	1.53				

Closure Data

				Total miles of closures		Mobility Avg Occurances/Mile/Year	
Segment	Length (miles)	# of closures	# with F&I	NB	SB	NB	SB
89U-1	8.00	11	2	21.0	4.0	0.53	0.10
89U-2	14.00	10	3	17.5	1.0	0.25	0.01
89U-3	15.00	3	1	0.0	3.0	0.00	0.04
89U-4	8.00	1	0	0.0	1.0	0.00	0.03
89U-5	16.00	14	5	10.0	4.0	0.13	0.05
89U-6	17.00	3	2	2.0	1.0	0.02	0.01
89U-7	26.00	6	2	4.0	2.0	0.03	0.02
89U-8	23.00	24	6	35.5	10.0	0.31	0.09
89U-9	3.00	2	0	1.0	1.0	0.07	0.07
89U-10	7.00	2	0	2.0	0.0	0.06	0.00

ITIS Category Description											
Closures		Incidents/Accidents		Incidents/Crashes		Obstruction Hazards		Winds		Winter Storm Codes	
NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
0	0	2	4	0	0	5	0	0	0	0	0
0	0	5	1	0	0	4	0	0	0	0	0
0	0	0	3	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0
0	0	10	4	0	0	0	0	0	0	0	0
0	0	2	1	0	0	0	0	0	0	0	0
0	0	4	2	0	0	0	0	0	0	0	0
0	0	12	10	0	0	2	0	0	0	0	0
0	0	1	0	0	0	0	1	0	0	0	0
0	0	2	0	0	0	0	0	0	0	0	0

HPMS Data

SEGMENT	MP_FROM	MP_TO	WEIGHTED AVERAGE NB/EB AADT	WEIGHTED AVERAGE SB/WB AADT	WEIGHTED AVERAGE AADT	NB/EB AADT	SB/WB AADT	2015 AADT	K Factor	D-Factor	T-Factor
89U-1	420	428	6117	6518	12635	6330	6760	13090	9	52	15
89U-2	428	442	3091	3193	6284	3013	3013	6026	9	50	19
89U-3	442	457	3130	3162	6292	3457	3432	6890	11	50	18
89U-4	457	465	3350	3351	6701	3328	3328	6656	9	50	14
89U-5	465	481	3397	3482	6879	3666	3665	7331	9	50	13
89U-6	481	498	1733	1711	3444	2029	1883	3914	13	52	15
89U-7	498	524	1555	1552	3107	1107	1106	2213	8	50	17
89U-8	524	547	1622	1597	3220	1745	1745	3489	8	50	15
89U-9	547	550	2955	3017	5972	2653	2732	5386	9	51	15
89U-10	550	557	2219	2255	4473	2504	2597	5101	6	51	16

SEGMENT	Loc ID	BMP	EMP	Length	Pos Dir AADT	Neg Dir AADT	Corrected Pos Dir AADT	Corrected Neg Dir AADT	AADT
89U-1	102066	420.38	420.88	0.50	0	0	15000	15000	30000
	102068	420.88	422.77	1.89	8220	8304	8220	8304	16525
	102070	422.77	426.80	4.03	5020	5508	5020	5508	10528
	102072	426.80	428.00	1.20	2860	3213	2835	2835	5669
89U-2	102072	428.00	442.00	14.00	2860	3213	2835	2835	5669
89U-3	102072	442.00	444.79	2.79	2860	3213	2835	2835	5669
	102073	444.79	457.00	12.21	2989	3072	2989	3072	6062
89U-4	102073	457.00	457.11	0.11	2989	3072	2989	3072	6062
	102074	457.11	465.00	7.89	0	0	3128	3128	6256
89U-5	102074	465.00	465.21	0.21	0	0	3128	3128	6256
	102075	465.21	480.80	15.59	3433	3512	3433	3512	6946
	102076	480.80	481.00	0.20	1772	1670	1708	1708	3415
89U-6	102076	481.00	498.00	17.00	1772	1670	1708	1708	3415
89U-7	102076	498.00	498.05	0.05	1772	1670	1708	1708	3415
	102320	498.05	523.92	25.87	0	0	1600	1600	3200
	102077	523.92	524.00	0.08	1652	1598	1652	1598	3250
89U-8	102077	524.00	546.19	22.19	1652	1598	1652	1598	3250
	102078	546.19	546.94	0.75	3258	2704	3258	2704	5962
	102079	546.94	547.00	0.06	0	0	3684	3684	7368
89U-9	102079	547.00	547.23	0.23	0	0	3684	3684	7368
	102080	547.23	548.51	1.28	0	0	2613	2613	5226
	102081	548.51	549.84	1.33	2167	2299	2167	2299	4466
	102082	549.84	550.00	0.16	2317	2403	2317	2403	4720
89U-10	102082	550.00	556.99	6.99	2317	2403	2317	2403	4720

Bicycle Accommodation Data

Segment	BMP	EMP	Divided or Non	NB/EB Right Shoulder Width	SB/WB Right Shoulder Width	NB/EB Left Shoulder Width	SB/WB Left Shoulder Width	NB/EB Effective Length of Shoulder	SB/WB Effective Length of Shoulder	% Bicycle Accommodation
89U-1	420	428	Undivided	4.4	4.4	N/A	N/A	1.5	1.5	19%
89U-2	428	442	Divided	9.9	8.0	4.2	4.0	14.0	13.2	97%
89U-3	442	457	Undivided	7.1	7.8	N/A	N/A	12.5	14.3	89%
89U-4	457	465	Undivided	8.1	7.9	N/A	N/A	7.8	7.3	94%
89U-5	465	481	Undivided	7.2	7.1	N/A	N/A	12.1	12.0	75%
89U-6	481	498	Undivided	8.0	7.9	N/A	N/A	16.9	16.6	99%
89U-7	498	524	Undivided	7.4	7.4	N/A	N/A	22.8	22.8	88%
89U-8	524	547	Undivided	4.6	4.6	N/A	N/A	0.4	0.4	2%
89U-9	547	550	Undivided	5.3	5.3	N/A	N/A	2.7	2.7	91%
89U-10	550	557	Undivided	5.1	5.1	N/A	N/A	0.2	0.2	3%

AZTDM Data

SEGMENT	Growth Rate	% Non-SOV
89U-1	2.04%	20.3%
89U-2	3.17%	18.1%
89U-3	2.30%	14.2%
89U-4	2.34%	6.3%
89U-5	2.54%	8.8%
89U-6	2.19%	11.1%
89U-7	3.53%	9.3%
89U-8	2.18%	11.1%
89U-9	2.38%	4.9%
89U-10	2.32%	4.9%

HERS Capacity Calculation Data

Segment	Capacity Environment Type	Facility Type	Terrain	Lane Width	NB/EB Rt. Shoulder	SB/WB Rt. Shoulder	F_{lw} or f_w or f_{LS}	NB/EB F_{lc}	SB/WB F_{lc}	Total Ramp Density[1]	PHF	E_T	f_{HV}	f_M	f_A	g/C^2	f_G	f_{NP}	Nm	f_p	NB/EB FFS	SB/WB FFS	NB/EB Peak-Hour Capacity	SB/WB Peak-Hour Capacity	Major Direction Peak-Hour Capacity	Daily Capacity[3]
89U-1	3	Fringe Urban	Level	12.00	4.40	4.40	1.0	N/A	N/A	N/A	0.9	2	0.873	N/A	N/A	0.55	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1641.47	31,266
89U-2	2	Rural	Rolling	12.00	9.89	8.00	0.0	0	0.4	N/A	0.88	2.5	0.779	0	0.36	N/A	N/A	N/A	N/A	N/A	64.64	64.24	3017	3017	N/A	57,462
89U-3	4	Rural	Level	12.00	7.11	7.81	0.0	N/A	N/A	N/A	0.88	1.3	0.948	N/A	0.27	N/A	1	1.95	N/A	N/A	74.73	74.73	N/A	N/A	1761.96	33,561
89U-4	4	Rural	Level	12.00	8.14	7.93	0.0	N/A	N/A	N/A	0.88	1.4	0.946	N/A	0.84	N/A	1	3.30	N/A	N/A	73.16	73.16	N/A	N/A	1600.96	30,495
89U-5	4	Rural	Level	12.00	7.20	7.12	0.0	N/A	N/A	N/A	0.88	1.4	0.949	N/A	0.41	N/A	1	3.05	N/A	N/A	68.59	68.59	N/A	N/A	1374.50	26,181
89U-6	4	Rural	Level	12.00	7.97	7.90	0.0	N/A	N/A	N/A	0.88	1.4	0.943	N/A	0.28	N/A	1	2.75	N/A	N/A	74.72	74.72	N/A	N/A	1709.51	32,562
89U-7	4	Rural	Level	12.00	7.39	7.39	0.0	N/A	N/A	N/A	0.88	1.9	0.865	N/A	0.67	N/A	1	2.50	N/A	N/A	73.33	73.33	N/A	N/A	1511.39	28,788
89U-8	4	Rural	Rolling	12.00	4.61	4.61	0.0	N/A	N/A	N/A	0.88	2.7	0.795	N/A	0.33	N/A	0.67	2.20	N/A	N/A	69.67	69.67	N/A	N/A	829.49	15,800
89U-9	4	Fringe Urban	Level	12.00	5.25	5.25	0.0	N/A	N/A	N/A	0.88	1.5	0.929	N/A	0.83	N/A	1	3.95	N/A	N/A	52.17	52.17	N/A	N/A	432.89	8,245
89U-10	4	Rural	Level	12.00	5.11	5.11	0.0	N/A	N/A	N/A	0.88	1.5	0.926	N/A	0.43	N/A	1	3.90	N/A	N/A	68.57	68.57	N/A	N/A	1295.87	24,683

Safety Performance Area Data

Segment	Operating Environment	Segment Length (miles)	NB/EB Fatal Crashes 2011-2015	SB/WB Fatal Crashes 2011-2015	NB/EB Incapacitating Injury Crashes	SB/WB Incapacitating Injury Crashes	Fatal + Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Areas Behaviors
89U-1	4 or 5 Lane Undivided Highway	8	1	0	4	1	1
89U-2	2 or 3 or 4 Lane Divided Highway	14	3	0	4	6	4
89U-3	2 or 3 Lane Undivided Highway	15	0	0	2	0	2
89U-4	2 or 3 Lane Undivided Highway	8	1	0	2	0	3
89U-5	2 or 3 Lane Undivided Highway	16	2	2	3	1	4
89U-6	2 or 3 Lane Undivided Highway	17	0	1	2	1	3
89U-7	2 or 3 Lane Undivided Highway	26	0	0	2	0	1
89U-8	2 or 3 Lane Undivided Highway	23	1	1	4	1	5
89U-9	2 or 3 Lane Undivided Highway	3	0	1	2	3	1
89U-10	2 or 3 Lane Undivided Highway	7	0	0	1	1	1

Segment	Segment Similar Operating Environment Type	Fatal + Incapacitating Injury Crashes Involving Trucks	Fatal + Incapacitating Injury Crashes Involving Motorcycles	Fatal + Incapacitating Injury Crashes Involving Non-Motorized Travelers	Weighted Average NB/EB AADT 2011-2015	Weighted Average SB/WB AADT 2011-2015	Weighted Average Total AADT 2011-2015
89U-1	4 or 5 Lane Undivided Highway	1	0	3	6117	6518	12635
89U-2	2 or 3 or 4 Lane Divided Highway	2	3	0	3091	3193	6284
89U-3	2 or 3 Lane Undivided Highway	0	0	0	3130	3162	6292
89U-4	2 or 3 Lane Undivided Highway	0	0	0	3350	3351	6701
89U-5	2 or 3 Lane Undivided Highway	0	2	0	3397	3482	6879
89U-6	2 or 3 Lane Undivided Highway	1	0	0	1733	1711	3444
89U-7	2 or 3 Lane Undivided Highway	0	0	0	1555	1552	3107
89U-8	2 or 3 Lane Undivided Highway	0	0	0	1622	1597	3220
89U-9	2 or 3 Lane Undivided Highway	0	0	1	2955	3017	5972
89U-10	2 or 3 Lane Undivided Highway	2	0	1	2219	2255	4473

HPMS Data

WEIGHTED AVERAGES for Safety						2015			2014			2013			2012			2011		
SEGMENT	MP_FROM	MP_TO	WEIGHTED AVERAGE NB/EB AADT	WEIGHTED AVERAGE SB/WB AADT	WEIGHTED AVERAGE AADT	NB/EB AADT	SB/WB AADT	2015 AADT	NB/EB AADT	SB/WB AADT	2014 AADT	NB/EB AADT	SB/WB AADT	2013 AADT	NB/EB AADT	SB/WB AADT	2012 AADT	NB/EB AADT	SB/WB AADT	2011 AADT
89U-1	420	428	6117	6518	12635	6330	6760	13090	6124	6403	12528	6012	6305	12318	5946	6657	12603	6173	6464	12638
89U-2	428	442	3091	3193	6284	3013	3013	6026	2835	2835	5669	2982	2982	5963	3468	3982	7450	3156	3156	6312
89U-3	442	457	3130	3162	6292	3457	3432	6890	2960	3028	5989	2953	2975	5930	3171	3236	6408	3107	3141	6244
89U-4	457	465	3350	3351	6701	3328	3328	6656	3126	3127	6253	3241	3242	6483	3781	3780	7561	3276	3277	6552
89U-5	465	481	3397	3482	6879	3666	3665	7331	3407	3484	6893	3314	3391	6705	3458	3587	7044	3140	3284	6424
89U-6	481	498	1733	1711	3444	2029	1883	3914	1708	1708	3415	1235	1221	2457	1747	1798	3545	1945	1945	3890
89U-7	498	524	1555	1552	3107	1107	1106	2213	1600	1600	3201	1473	1467	2941	1653	1642	3295	1943	1943	3887
89U-8	524	547	1622	1597	3220	1745	1745	3489	1710	1640	3349	1640	1640	3279	1664	1615	3278	1458	1433	2891
89U-9	547	550	2955	3017	5972	2653	2732	5386	2482	2545	5026	3120	3142	6262	3589	3550	7139	2929	3118	6046
89U-10	550	557	2219	2255	4473	2504	2597	5101	2317	2403	4720	1911	1911	3822	2299	2299	4598	2063	2063	4126

Freight Performance Area Data

Segment #	Segment Mileposts	Facility Type	Freight Index (FI) (1/TPTI)	Freight Index Description	NB/EB Average TTTI	SB/WB Average TTTI	Combined Average Peak TTTI	NB/EB Average TPTI	SB/WB Average TPTI	Combined Average Peak TPTI	Average Minutes Per Year Given Milepost Is Closed Per Segment Mile (NB/EB)	Average Minutes Per Year Given Milepost Is Closed Per Segment Mile (SB/WB)	Bridge Vertical Clearance in Feet
89U-1	420 - 428	Interrupted	0.42	Good	1.19	1.16	1.17	2.66	2.11	2.38	2620.49	18.18	No UP
89U-2	428 - 442	Uninterrupted	0.68	Fair	1.10	1.16	1.13	1.38	1.58	1.48	1466.09	1.09	No UP
89U-3	442 - 457	Uninterrupted	0.76	Fair	1.05	1.11	1.08	1.22	1.40	1.31	0.00	6.57	No UP
89U-4	457 - 465	Uninterrupted	0.38	Poor	1.22	1.32	1.27	2.70	2.54	2.62	0.00	2.95	No UP
89U-5	465 - 481	Interrupted	0.55	Good	1.14	1.20	1.17	1.65	1.99	1.82	17.75	7.90	No UP
89U-6	481 - 498	Uninterrupted	0.77	Good	1.07	1.06	1.06	1.29	1.30	1.29	7.13	2.54	No UP
89U-7	498 - 524	Uninterrupted	0.70	Fair	1.05	1.07	1.06	1.43	1.41	1.42	8.37	1.47	No UP
89U-8	524 - 547	Uninterrupted	0.41	Poor	1.27	1.31	1.29	2.63	2.27	2.45	175175.61	16.97	No UP
89U-9	547 - 550	Interrupted	0.28	Fair	1.40	1.43	1.42	3.19	4.09	3.64	11.53	192.53	No UP
89U-10	550 - 557	Interrupted	0.48	Good	1.21	1.19	1.20	2.01	2.14	2.07	10.74	0.00	No UP

			Total minutes of closures		Freight Avg Mins/Mile/Year	
Segment	Length (miles)	# of closures	NB	SB	NB	SB
89U-1	8.00	11	104819.6	727.0	2620.49	18.18
89U-2	14.00	10	102626.0	76.0	1466.09	1.09
89U-3	15.00	3	0.0	493.0	0.00	6.57
89U-4	8.00	1	0.0	118.0	0.00	2.95
89U-5	16.00	14	1420.0	632.0	17.75	7.90
89U-6	17.00	3	606.0	216.0	7.13	2.54
89U-7	26.00	6	1088.0	191.0	8.37	1.47
89U-8	23.00	24	20145195.5	1952.0	175175.61	16.97
89U-9	3.00	2	173.0	2888.0	11.53	192.53
89U-10	7.00	2	376.0	0.0	10.74	0.00

See the **Mobility Performance Area Data** section for other Freight Performance Area related data.

Appendix D: Needs Analysis Contributing Factors and Scores

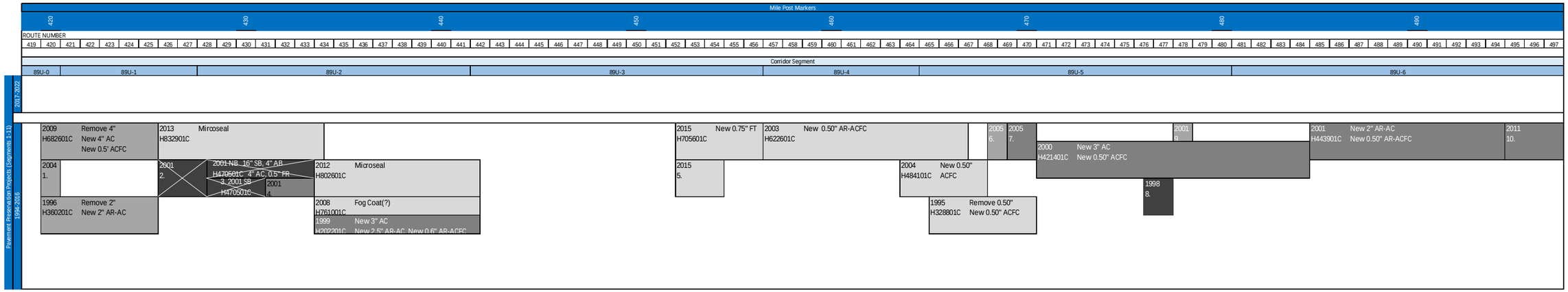
Pavement Performance Needs Analysis – Step 1

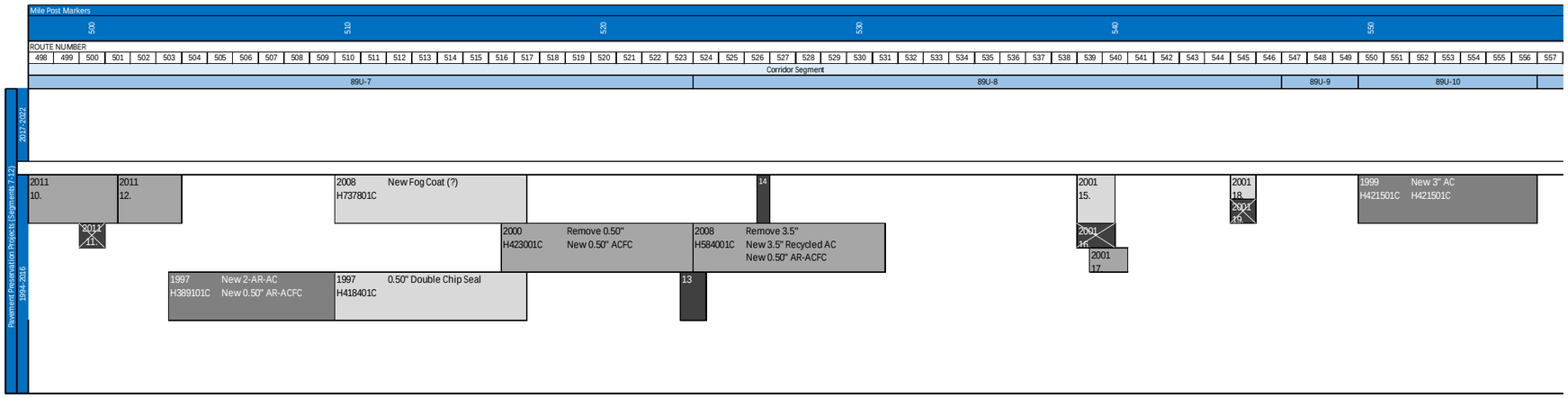
Segment #	Segment Length (miles)	Segment Mileposts (MP)	Facility Type	Pavement Index			Directional PSR					% Area Failure			Initial Need
				Performance Score	Performance Objective	Level of Need	Performance Score		Performance Objective	Level of Need		Performance Score	Performance Objective	Level of Need	
							NB	SB		NB	SB				
89U-1	8	420-428	Highway	4.29	Fair or Better	None	4.19	3.04	Fair or Better	None	Medium	0.00%	Fair or Better	None	Low
89U-2	14	428-442	Highway	4.02	Fair or Better	None	3.70	4.04	Fair or Better	None	None	0.00%	Fair or Better	None	None
89U-3	15	442-457	Highway	3.73	Fair or Better	None	3.47	3.28	Fair or Better	None	Low	0.00%	Fair or Better	None	Low
89U-4	8	457-465	Highway	3.64	Fair or Better	None	3.45	3.45	Fair or Better	None	None	12.50%	Fair or Better	Low	Low
89U-5	16	465-481	Highway	3.66	Fair or Better	None	3.35	3.35	Fair or Better	None	None	12.50%	Fair or Better	Low	Low
89U-6	17	481-498	Highway	4.04	Fair or Better	None	3.73	3.73	Fair or Better	None	None	0.00%	Fair or Better	None	None
89U-7	26	498-524	Highway	4.01	Fair or Better	None	3.85	3.85	Fair or Better	None	None	0.00%	Fair or Better	None	None
89U-8	23	524-547	Highway	3.72	Fair or Better	None	3.71	3.71	Fair or Better	None	None	8.70%	Fair or Better	None	None
89U-9	3	547-550	Highway	2.98	Fair or Better	Medium	3.19	3.19	Fair or Better	Low	Low	66.67%	Fair or Better	High	High
89U-10	7	550-557	Highway	3.82	Fair or Better	None	3.86	3.86	Fair or Better	None	None	0.00%	Fair or Better	None	None
Emphasis Area?	Yes	Weighted Average		3.86	Good	None									

Pavement Performance Area - Needs Analysis Step 2

Segment #	Segment Length (miles)	Segment Mileposts (MP)	Initial Need	Need Adjustments		Final Need	Comments (may include programmed projects or issues from previous reports)
				Hot Spots	Previous Projects (which supersede condition data)		
89U-1	8	420-428	Low	-	-	Low	No Previous Completed Projects that supersede condition data
89U-2	14	428-442	None	-	-	None	No Previous Completed Projects that supersede condition data
89U-3	15	442-457	Low	-	-	Low	No Previous Completed Projects that supersede condition data
89U-4	8	457-465	Low	MP 457-458	-	Low	No Previous Completed Projects that supersede condition data
89U-5	16	465-481	Low	MP 470-471, MP 474-475	-	Low	No Previous Completed Projects that supersede condition data
89U-6	17	481-498	None	-	-	None	No Previous Completed Projects that supersede condition data
89U-7	26	498-524	None	-	-	None	No Previous Completed Projects that supersede condition data
89U-8	23	524-547	None	MP 524-525, MP 533-534	-	Low	No Previous Completed Projects that supersede condition data; Need increased to "Low" due to hotspot
89U-9	3	547-550	High	MP 547-548, MP 549-550	-	High	No Previous Completed Projects that supersede condition data
89U-10	7	550-557	None	-	-	None	No Previous Completed Projects that supersede condition data

Pavement History





Pavement Treatment Reference Numbers	
1. 11/4/2004 H682601C (NB/SB): Remove 2" AC, New 2" AC	14. 4/20/2015 H864102C (NB/SB): New 8" AB, 6" AC, 0.50" FC [Landslide Repair) **
2. 6/28/2001 H304901C (NB/SB): New 16" SB, New 4" AB, New 4" AC, New 0.50" FR	15. 6/26/2001 H484201C (NB/SB): New 0.5" FR
3. 6/28/2001 H470501C (SB): New 16" SB, 4" AB, 4" AC, 0.50" FR	16. 6/26/2001 H484201C (SB): New 8" AB, 4" AC, 0.5" FR
4. 6/28/2001 H470501C (SB): Remove 2", New 2" AC, 2" AR, 0.50" FR	17. 6/26/2001 H484201C (SB): Remove 2", New 2" AC, 0.5" FR
5. 10/28/2015 H705601C (NB/SB): Remove 2", New 2" AC, 0.75" FT	18. 6/26/2001 H484201C (NB/SB): New 0.5" FR
6. 10/20/2005 H635801C (NB/SB): Remove 4", New 4" AC. 0.80" FR	19. 6/26/2001 H484201C (SB): New 8" AB, 4" AC, 0.5" FR
7. 10/20/2005 H635801C (NB/SB): Remove 0.5", New 3" AC, 0.8" FR	
8. 6/18/1998 H327601C (NB/SB): New 6" AB, 5.5" AC, 0.60" DC	
9. 6/26/2001 H484101C (SB): Remove 2.5", New 2" AC, 0.50" FR	
10. 9/13/2011 H682701C (NB/SB): New 2.5" AC, 0.50" FC	
11. 9/13/2011 H682701C (SB): New 12" AB, 5" AC, 0.50" FC	
12. 9/13/2001 H682701C (NB/SB): New 3" AC, 0.5" FC	
13. 7/20/1994 H051304C (NB/SB): New 6" AB, 4" AC, 0.30" SC, 0" FL	

Legend

- New Paving or Reconstruction
- Mill and Overlay (Adding Structural Thickness)
- Mill and Replace (No Change Structural Thickness)
- Fog Coat or Thin Overlay Treatments
- PCCP Pavement Border
- AC Pavement Border

** Landslide Repair Area shown for Information Only. This area is not included on Bid History Investment tab

X'd out box was project that added additional lanes. This area is not included on Bid History Investment tab.

Bid History Investment

Value	Level	Segment Number																			
		1		2		3		4		5		6		7		8		9		10	
		Uni-Dir	Bi-Dir	Uni-Dir	Bi-Dir	Uni-Dir	Bi-Dir	Uni-Dir	Bi-Dir	Uni-Dir	Bi-Dir	Uni-Dir	Bi-Dir	Uni-Dir	Bi-Dir	Uni-Dir	Bi-Dir	Uni-Dir	Bi-Dir	Uni-Dir	Bi-Dir
1	L1		30%	60%	45%	5%	35%		100%		15%				30%	10%	15%				
1					60%		5%		15%		20%				30%						
1											35%										
1																					
3	L2		70%				20%			5%	5%				15%		35%				
3			70%												10%		15%				
3															25%						
3																					
3																					
3																					
4	L3			60%		5%					10%		25%		30%						100%
4				20%							65%		60%								
4													15%								
4																					
6	L4										25%				5%	5%					
6																					
6																					
6																					
6																					
6																					
Sub-Total		0.0	4.5	3.8	1.1	0.3	1.0	0.0	1.2	0.2	5.4	0.0	4.0	0.0	3.6	0.4	1.7	0.0	0.0	0.0	4.0
Total		**4.5**		**3.0**		**1.1**		**1.2**		**5.4**		**4.0**		**3.6**		**1.9**		**0.0**		**4.0**	

Pavement Performance Area - Needs Analysis Step 3

Segment #	Segment Length (miles)	Segment Mileposts (MP)	Final Need	Bid History Investment	PeCos History Investment	Resulting Historical Investment	Contributing Factors and Comments
89U-1	8	420-428	Low	Low	Low	Low	
89U-2	14	428-442	None	Low	Medium	Low	
89U-3	15	442-457	Low	Low	Medium	Low	
89U-4	8	457-465	Low	Low	Low	Low	Pavement failure hot spot MP 457-458
89U-5	16	465-481	Low	Medium	High	High	Pavement failure hot spots MP 470-471, MP 474-475; clay soils under highway cause heaving
89U-6	17	481-498	None	Low	Medium	Medium	
89U-7	26	498-524	None	Low	Medium	Low	
89U-8	23	524-547	Low	Low	Low	Low	Pavement failure hot spots MP 524-525, MP 533-534; clay soils under highway cause heaving
89U-9	3	547-550	High	Low	Low	Low	Pavement failure hot spots MP 547-548, MP 549-550
89U-10	7	550-557	None	Low	Low	Low	

Pavement Historical Investment

Segment	Pavement History Value (bid projects)	Pavement History (bid projects)	PeCos ($/mile/yr)	PeCos	Resulting Historical Investment
89U-1	4.5	Low	$899	Low	Low
89U-2	3.0	Low	$1,920	Medium	Low
89U-3	1.1	Low	$3,261	Medium	Low
89U-4	1.2	Low	$185	Low	Low
89U-5	5.4	Medium	$4,510	High	High
89U-6	4.0	Low	$3,336	Medium	Low
89U-7	3.6	Low	$1,300	Medium	Low
89U-8	1.9	Low	$524	Low	Low
89U-9	0.0	Low	$384	Low	Low
89U-10	4.0	Low	$418	Low	Low

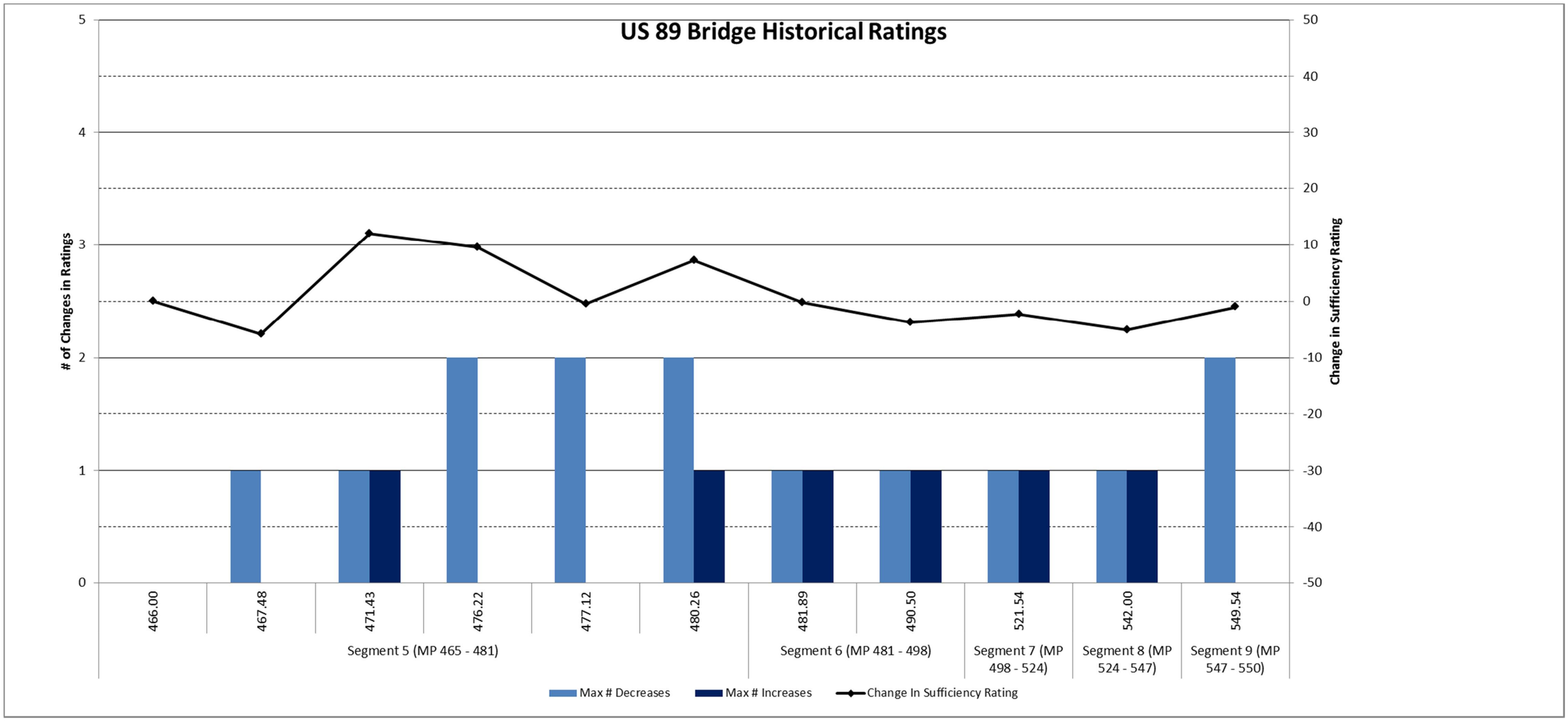
Bridge Performance Area - Needs Analysis Step 1

Segment #	Segment Length (miles)	Segment Mileposts (MP)	Number of Bridges in Segment	Bridge Index			Lowest Bridge Rating			Sufficiency Rating			% of Deck Area on Functionally Obsolete Bridges			Initial Need
				Performance Score	Performance Objective	Level of Need	Performance Score	Performance Objective	Level of Need	Performance Score	Performance Objective	Level of Need	Performance Score	Performance Objective	Level of Need	
89U-1	8	420-428	0	No Bridges	Fair or Better	None	No Bridges	Fair or Better	None	No Bridges	Fair or Better	None	No Bridges	Fair or Better	None	None
89U-2	14	428-442	0	No Bridges	Fair or Better	None	No Bridges	Fair or Better	None	No Bridges	Fair or Better	None	No Bridges	Fair or Better	None	None
89U-3	15	442-457	0	No Bridges	Fair or Better	None	No Bridges	Fair or Better	None	No Bridges	Fair or Better	None	No Bridges	Fair or Better	None	None
89U-4	8	457-465	0	No Bridges	Fair or Better	None	No Bridges	Fair or Better	None	No Bridges	Fair or Better	None	No Bridges	Fair or Better	None	None
89U-5	16	465-481	6	6.80	Fair or Better	None	5	Fair or Better	Low	86.4	Fair or Better	None	8.5%	Fair or Better	None	Low
89U-6	17	481-498	2	4.46	Fair or Better	High	4	Fair or Better	Medium	58.0	Fair or Better	Medium	0.0%	Fair or Better	None	High
89U-7	26	498-524	1	6.00	Fair or Better	None	6	Fair or Better	None	77.1	Fair or Better	None	0.0%	Fair or Better	None	None
89U-8	23	524-547	1	6.00	Fair or Better	None	6	Fair or Better	None	73.1	Fair or Better	None	0.0%	Fair or Better	None	None
89U-9	3	547-550	1	6.00	Fair or Better	None	6	Fair or Better	None	67.7	Fair or Better	Low	0.0%	Fair or Better	None	Low
89U-10	7	550-557	0	No Bridges	Fair or Better	None	No Bridges	Fair or Better	None	No Bridges	Fair or Better	None	No Bridges	Fair or Better	None	None
Emphasis Area?	No	Weighted Avg		6.16	Fair or Better	None										

Bridge Performance Area - Needs Analysis Step 2

Segment #	Segment Length (miles)	Segment Mileposts (MP)	Number of Bridges in Segment	Initial Need	Need Adjustments		Final Need	Historical Review	# Functionally Obsolete Bridges	Comments
					Hot Spots (Rating of 4 or multiple 5's)	Previous Projects (which supersede condition data)				
89U-1	8	420-428	0	None	None	-	None	-	0	No bridges with current ratings of 4 or 5 and no historical issues
89U-2	14	428-442	0	None	None	-	None	-	0	No bridges with current ratings of 4 or 5 and no historical issues
89U-3	15	442-457	0	None	None	-	None	-	0	No bridges with current ratings of 4 or 5 and no historical issues
89U-4	8	457-465	0	None	None	-	None	-	0	No bridges with current ratings of 4 or 5 and no historical issues
89U-5	16	465-481	6	Low	None	-	Low	-	1	Wash Bridge (#696)(MP467.48), Bridge (#580)(MP 476.22), Bridge (#581)(MP 480.26) have Structural Evaluation ratings of 5; Five Mile Wash Bridge (#697)(MP 471.43) is Functionally Obsolete
89U-6	17	481-498	2	High	Wash Bridge (#582)(MP 481.89)	-	High	-	0	Wash Bridge (#582)(MP 481.89) has a Deck and Sub rating of 5 and Super and Evaluation rating of 4
89U-7	26	498-524	1	None	None	-	None	-	0	No bridges with current ratings of 4 or 5 and no historical issues
89U-8	23	524-547	1	None	None	-	None	-	0	No bridges with current ratings of 4 or 5 and no historical issues
89U-9	3	547-550	1	Low	None	-	Low	-	0	No bridges with current ratings of 4 or 5 and no historical issues
89U-10	7	550-557	0	None	None	-	None	-	0	No bridges with current ratings of 4 or 5 and no historical issues

Bridge Ratings History



Maximum # of Decreases: Maximum number of times that the Deck Rating, Substructure Rating, or Superstructure Rating decreased from 1997 to 2014. (Higher number could indicate a more dramatic decline in the performance of the bridge)

Maximum # of Increases: Maximum number of times that the Deck Rating, Substructure Rating, or Superstructure Rating increased from 1997 to 2014. (Higher number could indicate a higher level of investment)

Change in Sufficiency Rating: Cumulative change in Sufficiency Rating from 1997 to 2014. (Bigger negative number could indicate a more dramatic decline in the performance of the bridge)

Bridge Performance Area - Needs Analysis Step 3

Segment #	Segment Length (Miles)	Segment Mileposts (MP)	Number of Bridges in Segment	# Functionally Obsolete Bridges	Final Need	Contributing Factors			Comments
						Bridge	Current Ratings	Historical Review	
89U-1	8	420-428	0	0	None	No bridges with current ratings less than 6 and no historical issues			
89U-2	14	428-442	0	0	None	No bridges with current ratings less than 6 and no historical issues			
89U-3	15	442-457	0	0	None	No bridges with current ratings less than 6 and no historical issues			
89U-4	8	457-465	0	0	None	No bridges with current ratings less than 6 and no historical issues			
89U-5	16	465-481	6	1	Low	Wash Bridge (#696)(MP467.48) Bridge (#580)(MP 476.22) Bridge (#581)(MP 480.26)	Structural Evaluation Rating of 5 Structural Evaluation Rating of 5 Structural Evaluation Rating of 5	These structures were not identified in historical review	
89U-6	17	481-498	2	0	High	Wash Bridge (#582)(MP 481.89)	Deck Rating of 5 Substructure Rating of 5 Strucural Evaluation Rating of 4 Superstructure Rating of 4	This structure was not identified in historical review	
89U-7	26	498-524	1	0	None	No bridges with current ratings less than 6 and no historical issues			
89U-8	23	524-547	1	0	None	No bridges with current ratings less than 6 and no historical issues			
89U-9	3	547-550	1	0	Low	No bridges with current ratings less than 6 and no historical issues			
89U-10	7	550-557	0	0	None	No bridges with current ratings less than 6 and no historical issues			

Mobility Performance Area - Needs Analysis Step 1

Segment #	Segment Mileposts	Segment Length (miles)	Environment Type	Facility Operation	Mobility Index			Future Daily V/C			Existing Peak Hour V/C					Closure Extent (occurrences/year/mile)				
					Performance Score	Performance Objective	Level of Need	Performance Score	Performance Objective	Level of Need	Performance Score		Performance Objective	Level of Need		Performance Score		Performance Objective	Level of Need	
											NB	SB		NB	SB	NB	SB		NB	SB
89U-1	420-428	8	Urban	Interrupted	0.52	Fair or Better	None	0.63	Fair or Better	None	0.36	0.38	Fair or Better	None	None	0.53	0.10	Fair or Better	Medium	None
89U-2	428-442	14	Rural	Uninterrupted	0.15	Fair or Better	None	0.20	Fair or Better	None	0.09	0.09	Fair or Better	None	None	0.25	0.01	Fair or Better	None	None
89U-3	442-457	15	Rural	Uninterrupted	0.26	Fair or Better	None	0.32	Fair or Better	None	0.21	0.21	Fair or Better	None	None	0.00	0.04	Fair or Better	None	None
89U-4	457-465	8	Rural	Uninterrupted	0.28	Fair or Better	None	0.35	Fair or Better	None	0.19	0.19	Fair or Better	None	None	0.00	0.03	Fair or Better	None	None
89U-5	465-481	16	Rural	Interrupted	0.37	Fair or Better	None	0.46	Fair or Better	None	0.24	0.24	Fair or Better	None	None	0.13	0.05	Fair or Better	None	None
89U-6	481-498	17	Rural	Uninterrupted	0.16	Fair or Better	None	0.19	Fair or Better	None	0.15	0.14	Fair or Better	None	None	0.02	0.01	Fair or Better	None	None
89U-7	498-524	26	Rural	Uninterrupted	0.11	Fair or Better	None	0.15	Fair or Better	None	0.06	0.06	Fair or Better	None	None	0.03	0.02	Fair or Better	None	None
89U-8	524-547	23	Rural	Uninterrupted	0.28	Fair or Better	None	0.34	Fair or Better	None	0.17	0.17	Fair or Better	None	None	0.31	0.09	Fair or Better	None	None
89U-9	547-550	3	Urban	Interrupted	0.85	Fair or Better	Medium	1.05	Fair or Better	High	0.54	0.56	Fair or Better	None	None	0.07	0.07	Fair or Better	None	None
89U-10	550-557	7	Rural	Uninterrupted	0.27	Fair or Better	None	0.33	Fair or Better	None	0.12	0.12	Fair or Better	None	None	0.06	0.00	Fair or Better	None	None
Mobility Emphasis Area		Yes	Weighted Average		0.25	Good	None													

Segment #	Segment Mileposts	Segment Length (miles)	Environment Type	Facility Operation	Directional TTI (all vehicles)				Directional PTI (all vehicles)					Bicycle Accommodation			Initial Need
					Performance Score		Performance Objective	Level of Need		Performance Score		Performance Objective	Level of Need		Performance Score	Performance Objective	Level of Need	
					NB	SB		NB	SB	NB	SB		NB	SB					
89U-1	420-428	8	Urban	Interrupted	1.12	1.11	Fair or Better	None	None	2.23	2.29	Fair or Better	None	None	19%	Fair or Better	High	Low
89U-2	428-442	14	Rural	Uninterrupted	1.02	1.03	Fair or Better	None	None	1.24	1.42	Fair or Better	None	Low	97%	Fair or Better	None	Low
89U-3	442-457	15	Rural	Uninterrupted	1.00	1.01	Fair or Better	None	None	1.14	1.25	Fair or Better	None	None	89%	Fair or Better	None	None
89U-4	457-465	8	Rural	Uninterrupted	1.11	1.17	Fair or Better	None	None	2.38	2.16	Fair or Better	High	High	94%	Fair or Better	None	Low
89U-5	465-481	16	Rural	Interrupted	1.10	1.13	Fair or Better	None	None	1.74	2.07	Fair or Better	None	None	75%	Fair or Better	Low	Low
89U-6	481-498	17	Rural	Uninterrupted	1.03	1.01	Fair or Better	None	None	1.50	1.28	Fair or Better	Medium	None	99%	Fair or Better	None	Low
89U-7	498-524	26	Rural	Uninterrupted	1.01	1.05	Fair or Better	None	None	1.53	1.60	Fair or Better	Medium	High	88%	Fair or Better	None	Low
89U-8	524-547	23	Rural	Uninterrupted	1.21	1.23	Fair or Better	None	Low	2.69	2.92	Fair or Better	High	High	2%	Fair or Better	High	Low
89U-9	547-550	3	Urban	Interrupted	1.30	1.38	Fair or Better	None	None	2.86	3.16	Fair or Better	None	None	91%	Fair or Better	None	High
89U-10	550-557	7	Rural	Uninterrupted	1.17	1.18	Fair or Better	None	None	2.40	2.43	Fair or Better	High	High	3%	Fair or Better	High	Low

Mobility Performance Area - Needs Analysis Step 2

Segment #	Segment Mileposts (MP)	Segment Length (miles)	Initial Need	Need Adjustments Recently Completed Projects	Final Need	Planned and Programmed Future Projects
89U-1	420-428	8	Low	-	Low	Planned: US 89 MP 421 SB DMS Sign, Arizona Statewide Dynamic Message Sign Master Plan, 2011 (ADOT)
89U-2	428-442	14	Low	-	Low	Planned: US 89 MP 434.5 SB DMS Sign, Arizona Statewide Dynamic Message Sign Master Plan, 2011 (ADOT)
89U-3	442-457	15	None	-	None	Planned: Widen Antelope Hills to five-lane undivided section (MP 442.2-442.6), US 89 Antelope Hills to Jct. US 160 MP 442 to MP 484 DCR, 2007
89U-4	457-465	8	Low	FY15 H705601C: South of Gray Mountain, Passing Lane Construction (MP 452-455.06) FY16 H791501C: US89 Little Colorado River, Roundabout and Lighting (MP 463-467)	Low	Planned: US 89 NB: MP463 - MP 466 Passing Lane, Climbing and Passing Lane Prioritization Study, 2015 (ADOT)
89U-5	465-481	16	Low	FY16 H791501C: US89 Little Colorado River, Roundabout and Lighting (MP 463-467)	Low	Planned: US 89 NB: MP463 - MP 466 Passing Lane, Climbing and Passing Lane Prioritization Study, 2015 (ADOT) New Rest Area MP 465, U.S. Bicycle Route 79 Distinction (MP 465-524), AASHTO U.S. Bicycle Route System, 2015 (ADOT) US 89 NB/SB: MP477-480 Passing Lane, Climbing and Passing Lane Prioritization Study, 2015 (ADOT) Jct. US 160 (MP 480.8) Diamond Interchange, US 89 Antelope Hills to Jct. 160 MP 442 to MP 484 DCR, 2007
89U-6	481-498	17	Low	-	Low	Planned: U.S. Bicycle Route 79 Distinction (MP 465-524), AASHTO U.S. Bicycle Route System, 2015 (ADOT)
89U-7	498-524	26	Low	-	Low	Planned: U.S. Bicycle Route 79 Distinction (MP 465-524), AASHTO U.S. Bicycle Route System, 2015 (ADOT) US 89 SB: MP502 - MP499 Passing Lane, Climbing and Passing Lane Prioritization Study, 2015 (ADOT) US 89 NB/SB: MP509 - MP512 Passing Lane, Climbing and Passing Lane Prioritization Study, 2015 (ADOT) US 89 MP 523 NB/SB Proposed DMS Sign, Arizona Statewide Dynamic Message Sign Master Plan, 2011 (ADOT)
89U-8	524-547	23	Low	-	Low	No Previous Completed Projects that supersede condition data
89U-9	547-550	3	High	-	High	No Previous Completed Projects that supersede condition data
89U-10	550-557	7	Low	-	Low	Planned: US 89 NB: MP550 - MP552 Climbing Lane, Climbing and Passing Lane Prioritization Study, 2015 (ADOT) US 89 SB: MP557 - MP555 Climbing Lane, Climbing and Passing Lane Prioritization Study, 2015 (ADOT)

Mobility Performance Area - Needs Analysis Step 3

Segment #	Segment Mileposts (MP)	Segment Length (miles)		Roadway Variables								Traffic Variables					Relevant Mobility Related Existing Infrastructure
			Final Need	Functional Classification	Environmental Type (Urban/Rural)	Terrain	# of Lanes/ Direction	Speed Limit	Aux Lanes	Divided/ Non-Divided	% No Passing	Existing LOS	Future 2035 LOS	% Trucks	NB Buffer Index (PTI-TTI)	SB Buffer Index (PTI-TTI)	
89U-1	420-428	8	Low	State Highway	Fringe/Urban	Level	4	54	No	Non-Divided	0%	A-C	A-C	15%	1.11	1.18	
89U-2	428-442	14	Low	State Highway	Rural	Rolling	4	65	No	Divided	0%	A/B	A/B	19%	0.21	0.40	
89U-3	442-457	15	None	State Highway	Rural	Level	2	65	No	Non-Divided	25%	A/B	A/B	18%	0.14	0.24	Passing/Climbing Lanes: NB MP 444-445, NB 448-449, NB 450-451
89U-4	457-465	8	Low	State Highway	Rural	Level	2	64	No	Non-Divided	63%	A/B	A/B	14%	1.27	1.00	Passing/Climbing Lanes: NB MP 460-462, SB MP 457-460, SB 464-465, DMS MP 463
89U-5	465-481	16	Low	State Highway	Rural	Level	2	59	No	Non-Divided	54%	A/B	A/B	13%	0.63	0.94	Passing/Climbing Lanes: NB 467.5-468.5, NB 471.5-472.5, NB 477.5-478.5, SB MP 469.5-471, SB 479.5-480.5
89U-6	481-498	17	Low	State Highway	Rural	Level	2	65	No	Non-Divided	27%	A/B	A/B	15%	0.48	0.27	Passing/Climbing Lanes: NB MP 493-495, SB MP 491.5-493
89U-7	498-524	26	Low	State Highway	Rural	Level	2	64	No	Non-Divided	46%	A/B	A/B	17%	0.52	0.55	Passing/Climbing Lanes: NB MP 507-509, NB MP 410.5-512.5, NB MP 518.5-520, SB MP 500-501, SB MP 505.5-507, SB MP508.5-511, SB MP 519.5-521
89U-8	524-547	23	Low	State Highway	Rural	Rolling	2	60	No	Non-Divided	41%	A/B	A/B	15%	1.48	1.69	Passing/Climbing Lanes: NB MP 524.5-528, SB MP 538.5-540/5, SB MP 545-546
89U-9	547-550	3	High	State Highway	Fringe/Urban	Level	2	43	No	Non-Divided	88%	D	E/F	15%	1.56	1.79	
89U-10	550-557	7	Low	State Highway	Rural	Level	2	59	No	Non-Divided	59%	A/B	A/B	16%	1.23	1.25	Open Rest Area: MP 511

Mobility Performance Area - Needs Analysis Step 3

Segment #	Segment Mileposts (MP)	Segment Length (miles)	Final Need	Closure Extent							Non-Actionable Conditions	Programmed and Planned Projects or Issues from Previous Documents Relevant to Final Need	Contributing Factors
				Total Number of Closures	# Incidents/ Accidents	% Incidents/ Accidents	# Obstructions/ Hazards	% Obstructions/ Hazards	# Weather Related	% Weather Related			
89U-1	420-428	8	Low	11	6	55%	5	45%	0	0%		Planned: US 89 MP 421 SB DMS Sign, Arizona Statewide Dynamic Message Sign Master Plan, 2011 (ADOT)	
89U-2	428-442	14	Low	10	6	60%	4	40%	0	0%		Planned: US 89 MP 434.5 SB DMS Sign, Arizona Statewide Dynamic Message Sign Master Plan, 2011 (ADOT)	
89U-3	442-457	15	None	3	3	100%	0	0%	0	0%		Planned: Widen Antelope Hills to five-lane undivided section (MP 442.2-442.6), US 89 Antelope Hills to Jct. US 160 MP 442 to MP 484 DCR, 2007	
89U-4	457-465	8	Low	1	1	100%	0	0%	0	0%		Planned: US 89 NB: MP463 - MP 466 Passing Lane, Climbing and Passing Lane Prioritization Study, 2015 (ADOT)	Elevated PTI possibly due to vehicles stopping at roadside pull-outs, or lack of passing opportunities, or other non-recurring delays
89U-5	465-481	16	Low	14	14	100%	0	0%	0	0%		Planned: US 89 NB: MP463 - MP 466 Passing Lane, Climbing and Passing Lane Prioritization Study, 2015 (ADOT) New Rest Area MP 465, Arizona Statewide Rest Area Study, 2010 (ADOT) U.S. Bicycle Route 79 Distinction (MP 465-524), AASHTO U.S. Bicycle Route System, 2015 (ADOT) US 89 NB/SB: MP477-480 Passing Lane, Climbing and Passing Lane Prioritization Study, 2015 (ADOT) Jct. US 160 (MP 480.8) Diamond Interchange, US 89 Antelope Hills to Jct. 160 MP 442 to MP 484 DCR, 2007	
89U-6	481-498	17	Low	3	3	100%	0	0%	0	0%		Planned: U.S. Bicycle Route 79 Distinction (MP 465-524), AASHTO U.S. Bicycle Route System, 2015 (ADOT)	

89U-7	498-524	26	Low	6	6	100%	0	0%	0	0%		Planned: U.S. Bicycle Route 79 Distinction (MP 465-524), AASHTO U.S. Bicycle Route System, 2015 (ADOT) US 89 SB: MP502 - MP499 Passing Lane, Climbing and Passing Lane Prioritization Study, 2015 (ADOT) US 89 NB/SB: MP509 - MP512 Passing Lane, Climbing and Passing Lane Prioritization Study, 2015 (ADOT) US 89 MP 523 NB/SB Proposed DMS Sign, Arizona Statewide Dynamic Message Sign Master Plan, 2011 (ADOT)	Elevated PTI possibly due to vehicles stopping at roadside pull-outs, or lack of passing opportunities, or other non-recurring delays
89U-8	524-547	23	Low	24	22	92%	2	8%	0	0%			Elevated PTI possibly due to vehicles stopping at roadside pull-outs, or lack of passing opportunities, or other non-recurring delays
89U-9	547-550	3	High	2	1	50%	1	50%	0	0%			Elevated V/C due to current and future traffic volumes and fringe-urban environment
89U-10	550-557	7	Low	2	2	100%	0	0%	0	0%		Planned: US 89 NB: MP550 - MP552 Climbing Lane, Climbing and Passing Lane Prioritization Study, 2015 (ADOT) US 89 SB: MP557 - MP555 Climbing Lane, Climbing and Passing Lane Prioritization Study, 2015 (ADOT)	Elevated PTI possibly due to vehicles stopping at scenic view points or other non-recurring delays, and lack of bicycle accommodation on shoulders.

Safety Performance Area - Needs Analysis Step 1

Segment	Operating Environment	Segment Length (miles)	Segment Mileposts (MP)	Safety Index			Directional Safety Index					% of Fatal + Incapacitating Injury Crashes Involving SHSP Top 5 Emphasis Areas Behaviors		
				Performance Score	Performance Objective	Level of Need	NB Performance Score	SB Performance Score	Performance Objective	NB Level of Need	SB Level of Need	Performance Score	Performance Objective	Level of Need
89U-1	4 or 5 Lane Undivided Highway	8	420-428	0.40	Average or Better	None	0.76	0.04	Average or Better	None	None	17%	Average or Better	None
89U-2	2 or 3 or 4 Lane Divided Highway	14	428-442	1.13	Average or Better	Medium	2.01	0.25	Average or Better	High	None	31%	Average or Better	None
89U-3	2 or 3 Lane Undivided Highway	15	442-457	0.05	Average or Better	None	0.10	0.00	Average or Better	None	None	*Insufficient Data*	Average or Better	N/A
89U-4	2 or 3 Lane Undivided Highway	8	457-465	0.77	Average or Better	None	1.53	0.00	Average or Better	High	None	*Insufficient Data*	Average or Better	N/A
89U-5	2 or 3 Lane Undivided Highway	16	465-481	1.43	Average or Better	High	1.48	1.38	Average or Better	High	High	63%	Average or Better	High
89U-6	2 or 3 Lane Undivided Highway	17	481-498	0.48	Average or Better	None	0.11	0.86	Average or Better	None	None	*Insufficient Data*	Average or Better	N/A
89U-7	2 or 3 Lane Undivided Highway	26	498-524	0.04	Average or Better	None	0.08	0.00	Average or Better	None	None	*Insufficient Data*	Average or Better	N/A
89U-8	2 or 3 Lane Undivided Highway	23	524-547	1.19	Average or Better	High	1.29	1.09	Average or Better	High	Medium	71%	Average or Better	High
89U-9	2 or 3 Lane Undivided Highway	3	547-550	2.49	Average or Better	High	0.51	4.47	Average or Better	None	High	17%	Average or Better	None
89U-10	2 or 3 Lane Undivided Highway	7	550-557	0.12	Average or Better	None	0.12	0.12	Average or Better	None	None	*Insufficient Data*	Average or Better	N/A
Safety Emphasis Area?		Yes	Weighted Average	0.68	Above Average	None								

Segment	Operating Environment	Segment Length (miles)	Segment Mileposts (MP)	% of Fatal + Incapacitating Injury Crashes Involving Trucks			% of Fatal + Incapacitating Injury Crashes Involving Motorcycles			% of Fatal + Incapacitating Injury Crashes Involving Non-Motorized Travelers			Initial Need
				Performance Score	Performance Objective	Level of Need	Performance Score	Performance Objective	Level of Need	Performance Score	Performance Objective	Level of Need	
89U-1	4 or 5 Lane Undivided Highway	8	420-428	*Insufficient Data*	Average or Better	N/A	*Insufficient Data*	Average or Better	N/A	*Insufficient Data*	Average or Better	N/A	None
89U-2	2 or 3 or 4 Lane Divided Highway	14	428-442	*Insufficient Data*	Average or Better	N/A	*Insufficient Data*	Average or Better	N/A	*Insufficient Data*	Average or Better	N/A	Medium
89U-3	2 or 3 Lane Undivided Highway	15	442-457	*Insufficient Data*	Average or Better	N/A	*Insufficient Data*	Average or Better	N/A	*Insufficient Data*	Average or Better	N/A	None
89U-4	2 or 3 Lane Undivided Highway	8	457-465	*Insufficient Data*	Average or Better	N/A	*Insufficient Data*	Average or Better	N/A	*Insufficient Data*	Average or Better	N/A	Low
89U-5	2 or 3 Lane Undivided Highway	16	465-481	*Insufficient Data*	Average or Better	N/A	*Insufficient Data*	Average or Better	N/A	*Insufficient Data*	Average or Better	N/A	High
89U-6	2 or 3 Lane Undivided Highway	17	481-498	*Insufficient Data*	Average or Better	N/A	*Insufficient Data*	Average or Better	N/A	*Insufficient Data*	Average or Better	N/A	None
89U-7	2 or 3 Lane Undivided Highway	26	498-524	*Insufficient Data*	Average or Better	N/A	*Insufficient Data*	Average or Better	N/A	*Insufficient Data*	Average or Better	N/A	None
89U-8	2 or 3 Lane Undivided Highway	23	524-547	*Insufficient Data*	Average or Better	N/A	*Insufficient Data*	Average or Better	N/A	*Insufficient Data*	Average or Better	N/A	High
89U-9	2 or 3 Lane Undivided Highway	3	547-550	*Insufficient Data*	Average or Better	N/A	*Insufficient Data*	Average or Better	N/A	*Insufficient Data*	Average or Better	N/A	High
89U-10	2 or 3 Lane Undivided Highway	7	550-557	*Insufficient Data*	Average or Better	N/A	*Insufficient Data*	Average or Better	N/A	*Insufficient Data*	Average or Better	N/A	None

Safety Performance Area - Needs Analysis Step 2

Segment	Segment Length (miles)	Segment Mileposts (MP)	Initial Need	Hot Spots	Relevant Recently Completed or Under Construction Projects (which supersede performance data)*	Final Need	Comments (may include tentatively programmed projects with potential to address need or other relevant issues identified in previous reports)
89U-1	8	420-428	None	-	-	None	No Previous Completed Projects that supersede condition data
89U-2	14	428-442	Medium	-	-	Medium	No Previous Completed Projects that supersede condition data
89U-3	15	442-457	None	-	-	None	No Previous Completed Projects that supersede condition data
89U-4	8	457-465	Low	-	FY16 H791501C: US89 Little Colorado River, Roundabout and Lighting (MP 463-467)	Low	No Previous Completed Projects that supersede condition data
89U-5	16	465-481	High	-	FY16 H791501C: US89 Little Colorado River, Roundabout and Lighting (MP 463-467)	High	No Previous Completed Projects that supersede condition data
89U-6	17	481-498	None	-	FY13 H864501C: US89 - SR98, New Facilities - Emergency Detour (MP 495-498)	None	
89U-7	26	498-524	None	-	FY13 H864101P: US89, Emergency Slope Repair- US89 (MP 523-526.5) FY14 H803801C: US89 at 89A, Intersection Lighting (MP 523-524.23)	None	
89U-8	23	524-547	High	-	FY13 H864101P: US89, Emergency Slope Repair- US89 (MP 523-526.5) FY15 H845601C: Page Roundabout at Haul Road, System Enhancement - Safety Improvement (MP 546-546.99)	High	Previous Completed Projects did not change the level of need.
89U-9	3	547-550	High	-	-	High	No Previous Completed Projects that supersede condition data
89U-10	7	550-557	None	-	-	None	No Previous Completed Projects that supersede condition data

Safety Performance Area - Needs Analysis Step 3

		89U-1	89U-2	89U-3	89U-4	89U-5	89U-6	89U-7	89U-8	89U-9	89U-10	Corridor-Wide Crash Characteristics
Segment Number		89U-1	89U-2	89U-3	89U-4	89U-5	89U-6	89U-7	89U-8	89U-9	89U-10	
Segment Length (miles)		8	14	15	8	16	17	26	23	3	7	
Segment Milepost (MP)		420-428	428-442	442-457	457-465	465-481	481-498	498-524	524-547	547-550	550-557	
Final Need		None	Medium	None	Low	High	None	None	High	High	None	
Segment Crash Overview		1 Crashes were fatal 5 Crashes had incapacitating injuries 1 Crashes involve trucks 0 Crashes involve Motorcycles	3 Crashes were fatal 10 Crashes had incapacitating injuries 2 Crashes involve trucks 3 Crashes involve Motorcycles	0 Crashes were fatal 2 Crashes had incapacitating injuries 0 Crashes involve trucks 0 Crashes involve Motorcycles	1 Crashes were fatal 2 Crashes had incapacitating injuries 0 Crashes involve trucks 0 Crashes involve Motorcycles	4 Crashes were fatal 4 Crashes had incapacitating injuries 0 Crashes involve trucks 2 Crashes involve Motorcycles	1 Crashes were fatal 3 Crashes had incapacitating injuries 1 Crashes involve trucks 0 Crashes involve Motorcycles	0 Crashes were fatal 2 Crashes had incapacitating injuries 0 Crashes involve trucks 0 Crashes involve Motorcycles	2 Crashes were fatal 5 Crashes had incapacitating injuries 0 Crashes involve trucks 0 Crashes involve Motorcycles	1 Crashes were fatal 5 Crashes had incapacitating injuries 0 Crashes involve trucks 0 Crashes involve Motorcycles	0 Crashes were fatal 2 Crashes had incapacitating injuries 2 Crashes involve trucks 0 Crashes involve Motorcycles	13 Crashes were fatal 40 Crashes had incapacitating injuries 6 Crashes involve trucks 5 Crashes involve Motorcycles
Segment Crash Summaries (Fatal and Serious Injury Crashes)	First Harmful Event Type	33% Involve Collision with Motor Vehicle 33% Involve Collision with Pedalcyclist 17% Involve Collision with Pedestrian	54% Involve Overturning 31% Involve Collision with Motor Vehicle 8% Involve Collision With Animal	N/A - Sample size too small	N/A - Sample size too small	67% Involve Collision with Motor Vehicle 33% Involve Overturning	N/A - Sample size too small	N/A - Sample size too small	57% Involve Collision with Motor Vehicle 43% Involve Overturning	67% Involve Collision with Motor Vehicle 17% Involve Other Non-Collision 17% Involve Collision with Pedestrian	N/A - Sample size too small	46% Involve Collision with Motor Vehicle 34% Involve Overturning 6% Involve Collision with Pedalcyclist
	Collision Type	33% Involve Other 17% Involve Left Turn 17% Involve Angle	69% Involve Single Vehicle 15% Involve Sideswipe (same) 8% Involve Angle	N/A - Sample size too small	N/A - Sample size too small	50% Involve Single Vehicle 25% Involve Head On 13% Involve Angle	N/A - Sample size too small	N/A - Sample size too small	43% Involve Single Vehicle 29% Involve Head On 14% Involve Angle	67% Involve Angle 17% Involve Other 17% Involve Left Turn	N/A - Sample size too small	43% Involve Single Vehicle 15% Involve Angle 13% Involve Head On
	Violation or Behavior	33% Involve Speed too Fast for Conditions 33% Involve No Improper Action 17% Involve Disregarded Traffic Signal	23% Involve Speed too Fast for Conditions 15% Involve Failure to Keep in Proper Lane 15% Involve Unknown	N/A - Sample size too small	N/A - Sample size too small	25% Involve Failure to Keep in Proper Lane 25% Involve Drove in Opposing Lane 13% Involve No Improper Action	N/A - Sample size too small	N/A - Sample size too small	29% Involve Unknown 14% Involve Failure to Yield Right-of-Way 14% Involve Speed too Fast for Conditions	50% Involve Failure to Yield Right-of-Way 17% Involve Disregarded Traffic Signal 17% Involve Made Improper Turn	N/A - Sample size too small	19% Involve Failure to Keep in Proper Lane 15% Involve Speed too Fast for Conditions 9% Involve No Improper Action
	Lighting Conditions	67% Occur in Daylight Conditions 17% Occur in Dark-Unlighted Conditions 17% Occur in Dark-Lighted Conditions	54% Occur in Dark-Unlighted Conditions 46% Occur in Daylight Conditions	N/A - Sample size too small	N/A - Sample size too small	50% Occur in Daylight Conditions 38% Occur in Dark-Unlighted Conditions 13% Occur in Dusk Conditions	N/A - Sample size too small	N/A - Sample size too small	57% Occur in Dark-Unlighted Conditions 43% Occur in Daylight Conditions	67% Occur in Daylight Conditions 17% Occur in Dawn Conditions 17% Occur in Dusk Conditions	N/A - Sample size too small	57% Occur in Daylight Conditions 34% Occur in Dark-Unlighted Conditions 6% Occur in Dusk Conditions

Segment Number		89U-1	89U-2	89U-3	89U-4	89U-5	89U-6	89U-7	89U-8	89U-9	89U-10	Corridor-Wide Crash Characteristics
Segment Length (miles)		8	14	15	8	16	17	26	23	3	7	
Segment Milepost (MP)		420-428	428-442	442-457	457-465	465-481	481-498	498-524	524-547	547-550	550-557	
Final Need		None	Medium	None	Low	High	None	None	High	High	None	
	Surface Conditions	67% Involve Dry Conditions 17% Involve Slush Conditions 17% Involve Wet Conditions	100 % Involve Dry Conditions	N/A - Sample size too small	N/A - Sample size too small	88% Involve Dry Conditions 13% Involve Wet Conditions	N/A - Sample size too small	N/A - Sample size too small	83% Involve Dry Conditions 17% Involve Wet Conditions	100 % Involve Dry Conditions	N/A - Sample size too small	89% Involve Dry Conditions 6% Involve Wet Conditions 2% Involve Slush Conditions
	First Unit Event	40% Involve a first unit event of Motor Vehicle in Transport 20% Involve a first unit event of Crossed Centerline 20% Involve a first unit event of Collision with Pedestrian	33% Involve a first unit event of Ran Off the Road (Left) 25% Involve a first unit event of Ran Off the Road (Right) 25% Involve a first unit event of Motor Vehicle in Transport	N/A - Sample size too small	N/A - Sample size too small	38% Involve a first unit event of Ran Off the Road (Right) 38% Involve a first unit event of Crossed Centerline 13% Involve a first unit event of Ran Off the Road (Left)	N/A - Sample size too small	N/A - Sample size too small	57% Involve a first unit event of Crossed Centerline 29% Involve a first unit event of Motor Vehicle in Transport 14% Involve a first unit event of Collision with Pedestrian	83% Involve a first unit event of Motor Vehicle in Transport 17% Involve a first unit event of Other Non-Collision	N/A - Sample size too small	31% Involve a first unit event of Motor Vehicle in Transport 27% Involve a first unit event of Crossed Centerline 20% Involve a first unit event of Ran Off the Road (Right)
	Driver Physical Condition	83% No Apparent Influence 17% Under the Influence of Drugs or Alcohol	62% No Apparent Influence 15% Under the Influence of Drugs or Alcohol 15% Fatigued/Fell Asleep	N/A - Sample size too small	N/A - Sample size too small	38% Under the Influence of Drugs or Alcohol 25% No Apparent Influence 25% Unknown	N/A - Sample size too small	N/A - Sample size too small	29% Under the Influence of Drugs or Alcohol 29% Under the Influence of Drugs or Alcohol 29% Unknown	100 % No Apparent Influence	N/A - Sample size too small	55% No Apparent Influence 21% Under the Influence of Drugs or Alcohol 13% Unknown
	Safety Device Usage	67% Shoulder And Lap Belt Used 17% None Used 17% Not Applicable	38% Shoulder And Lap Belt Used 23% None Used 23% Air Bag Deployed/Shoulder-Lap Belt	N/A - Sample size too small	N/A - Sample size too small	38% Shoulder And Lap Belt Used 25% Helmet Used 25% Air Bag Deployed/Shoulder-Lap Belt	N/A - Sample size too small	N/A - Sample size too small	57% Shoulder And Lap Belt Used 14% Air Bag Deployed/Shoulder-Lap Belt 14% None Used	67% Shoulder And Lap Belt Used 17% None Used 17% Not Applicable	N/A - Sample size too small	51% Shoulder And Lap Belt Used 19% None Used 15% Air Bag Deployed/Shoulder-Lap Belt
Hot Spot Crash Summaries		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Previously Completed Safety-Related Projects						Roundabout at Jct SR 64				Roundabout at Haul Rd		
District Input						Issues near SR 64 Jct			Overflow parking on shoulder near Horseshoe bend turnoff	Intersection related crashes at South Lake Powell Blvd and North Lake Powell Blvd		

Segment Number	89U-1	89U-2	89U-3	89U-4	89U-5	89U-6	89U-7	89U-8	89U-9	89U-10	Corridor-Wide Crash Characteristics
Segment Length (miles)	8	14	15	8	16	17	26	23	3	7	
Segment Milepost (MP)	420-428	428-442	442-457	457-465	465-481	481-498	498-524	524-547	547-550	550-557	
Final Need	None	Medium	None	Low	High	None	None	High	High	None	
Contributing Factors		Roadside design; shoulder width or condition; Delineation and visibility; Excessive speed			Shoulder width or condition; Delineation and visibility			Shoulder width or condition; Roadside design; Delineation and visibility	Sight distance; Failure to yield/stop; Access point conflicts		

Freight Performance Area - Needs Analysis Step 1

Segment #	Facility Operations	Segment Mileposts (MP)	Segment Length (miles)	Freight Index			Directional TTI (trucks only)					Directional PTI (trucks only)				
				Performance Score	Performance Objective	Level of Need	Performance Score		Performance Objective	Level of Need		Performance Score		Performance Objective	Level of Need	
							NB	SB		NB	SB	NB	SB		NB	SB
89U-1	Interrupted	420-428	8	0.42	Fair or Better	None	1.19	1.16	Fair or Better	None	None	2.66	2.11	Fair or Better	None	None
89U-2	Uninterrupted	428-442	14	0.68	Fair or Better	Medium	1.10	1.16	Fair or Better	None	None	1.38	1.58	Fair or Better	Low	High
89U-3	Uninterrupted	442-457	15	0.76	Fair or Better	None	1.05	1.11	Fair or Better	None	None	1.22	1.40	Fair or Better	None	Low
89U-4	Uninterrupted	457-465	8	0.38	Fair or Better	High	1.22	1.32	Fair or Better	Low	Medium	2.70	2.54	Fair or Better	High	High
89U-5	Interrupted	465-481	16	0.55	Fair or Better	None	1.14	1.20	Fair or Better	None	None	1.65	1.99	Fair or Better	None	None
89U-6	Uninterrupted	481-498	17	0.77	Fair or Better	None	1.07	1.06	Fair or Better	None	None	1.29	1.30	Fair or Better	None	None
89U-7	Uninterrupted	498-524	26	0.70	Fair or Better	Low	1.05	1.07	Fair or Better	None	None	1.43	1.41	Fair or Better	Low	Low
89U-8	Uninterrupted	524-547	23	0.41	Fair or Better	High	1.27	1.31	Fair or Better	Medium	Medium	2.63	2.27	Fair or Better	High	High
89U-9	Interrupted	547-550	3	0.28	Fair or Better	Low	1.40	1.43	Fair or Better	None	None	3.19	4.09	Fair or Better	None	Low
89U-10	Interrupted	550-557	7	0.48	Fair or Better	None	1.21	1.19	Fair or Better	None	None	2.01	2.14	Fair or Better	None	None
Emphasis Area?	No	Weighted Average		0.59	Fair or Better	Low										

Segment	Facility Operations	Segment Mileposts (MP)	Segment Length (miles)	Closure Duration (minutes/mile/year)					Bridge Clearance (feet)			Initial Need
				Performance Score		Performance Objective	Level of Need		Performance Score	Performance Objective	Level of Need	
				NB	SB		NB	SB				
89U-1	Interrupted	420-428	8	2620.49	18.18	Fair or Better	High	None	No UP	Fair or Better	None	Low
89U-2	Uninterrupted	428-442	14	1466.09	1.09	Fair or Better	High	None	No UP	Fair or Better	None	High
89U-3	Uninterrupted	442-457	15	0.00	6.57	Fair or Better	None	None	No UP	Fair or Better	None	Low
89U-4	Uninterrupted	457-465	8	0.00	2.95	Fair or Better	None	None	No UP	Fair or Better	None	High
89U-5	Interrupted	465-481	16	17.75	7.90	Fair or Better	None	None	No UP	Fair or Better	None	None
89U-6	Uninterrupted	481-498	17	7.13	2.54	Fair or Better	None	None	No UP	Fair or Better	None	None
89U-7	Uninterrupted	498-524	26	8.37	1.47	Fair or Better	None	None	No UP	Fair or Better	None	Low
89U-8	Uninterrupted	524-547	23	175175.61	16.97	Fair or Better	High	None	No UP	Fair or Better	None	High
89U-9	Interrupted	547-550	3	11.53	192.53	Fair or Better	None	High	No UP	Fair or Better	None	Low
89U-10	Interrupted	550-557	7	10.74	0.00	Fair or Better	None	None	No UP	Fair or Better	None	None

Freight Performance Area - Needs Analysis Step 2

Segment #	Segment Length (miles)	Segment Mileposts (MP)	Initial Need	Vertical Clearance Hot Spots (Vertical Clearance < 16.25' and No Ramps)	Relevant Recently Completed or Under Construction Projects (which supersede performance data)*	Final Need	Comments (may include tentatively programmed projects with potential to address needs or other relevant issues identified in previous reports)
89U-1	8	420-428	Low	-	-	Low	No Previous Completed Projects that supersede condition data
89U-2	14	428-442	High	-	-	High	No Previous Completed Projects that supersede condition data
89U-3	15	442-457	Low	-	FY15 H705601C: South of Gray Mountain, Passing Lane Construction (MP 452-455.06)	Low	Previous Completed Project did not change the level of need.
89U-4	8	457-465	High	-	-	High	No Previous Completed Projects that supersede condition data
89U-5	16	465-481	None	-	-	None	No Previous Completed Projects that supersede condition data
89U-6	17	481-498	None	-	-	None	No Previous Completed Projects that supersede condition data
89U-7	26	498-524	Low	-	-	Low	No Previous Completed Projects that supersede condition data
89U-8	23	524-547	High	-	-	High	No Previous Completed Projects that supersede condition data
89U-9	3	547-550	Low	-	-	Low	No Previous Completed Projects that supersede condition data
89U-10	7	550-557	None	-	-	None	No Previous Completed Projects that supersede condition data

Freight Performance Area - Needs Analysis Step 3

Segment #	Segment Mileposts (MP)	Segment Length (miles)		Roadway Variables								Traffic Variables					Relevant Freight Related Existing Infrastructure
			Final Need	Functional Classification	Environmental Type (Urban/Rural)	Terrain	# of Lanes/ Direction	Speed Limit	Aux Lanes	Divided/ Non-Divided	% No Passing	Existing LOS	Future 2035 LOS	% Trucks	NB/EB Buffer Index (TPTI-TTTI)	SB/WB Buffer Index (TPTI-TTTI)	
89U-1	420-428	8	Low	State Highway	Fringe Urban	Level	4	54	No	Non-Divided	0%	A-C	A-C	15%	1.47	0.95	
89U-2	428-442	14	High	State Highway	Rural	Rolling	4	65	No	Divided	0%	A-C	A-C	19%	0.27	0.42	Passing/Climbing Lanes: NB MP 444-445, NB 448-449, NB 450-451
89U-3	442-457	15	Low	State Highway	Rural	Level	2	65	No	Non-Divided	25%	A-C	A-C	18%	0.18	0.29	Passing/Climbing Lanes: NB MP 460-462, SB MP 457-460, SB 464-465, DMS MP 463
89U-4	457-465	8	High	State Highway	Rural	Level	2	64	No	Non-Divided	63%	A-C	A-C	14%	1.48	1.22	Passing/Climbing Lanes: NB 467.5-468.5, NB 471.5-472.5, NB 477.5-478.5, SB MP 469.5-471, SB 479.5-480.5
89U-5	465-481	16	None	State Highway	Rural	Level	2	59	No	Non-Divided	54%	A-C	A-C	13%	0.51	0.79	Passing/Climbing Lanes: NB MP 493-495, SB MP 491.5-493
89U-6	481-498	17	None	State Highway	Rural	Level	2	65	No	Non-Divided	27%	A-C	A-C	15%	0.22	0.24	Passing/Climbing Lanes: NB MP 507-509, NB MP 410.5-512.5, NB MP 518.5-520, SB MP 500-501, SB MP 505.5-507, SB MP508.5-511, SB MP 519.5-521
89U-7	498-524	26	Low	State Highway	Rural	Level	2	64	No	Non-Divided	46%	A-C	A-C	17%	0.38	0.34	Passing/Climbing Lanes: NB MP 524.5-528, SB MP 538.5-540/5, SB MP 545-546
89U-8	524-547	23	High	State Highway	Rural	Rolling	2	60	No	Non-Divided	41%	A-C	A-C	15%	1.36	0.96	
89U-9	547-550	3	Low	State Highway	Fringe Urban	Level	2	43	No	Non-Divided	88%	D	E/F	15%	1.79	2.65	Open Rest Area: MP 511
89U-10	550-557	7	None	State Highway	Rural	Level	2	59	No	Non-Divided	59%	A-C	A-C	16%	0.80	0.95	Page Port of Entry

Segment #	Segment Mileposts (MP)	Segment Length (miles)	Final Need	Closure Extent							Non-Actionable Conditions	Programmed and Planned Projects or Issues from Previous Documents Relevant to Final Need	Contributing Factors
				Total Number of Closures	# Incidents/ Accidents	% Incidents/ Accidents	# Obstructions/ Hazards	% Obstructions/ Hazards	# Weather Related	% Weather Related			
89U-1	420-428	8	Low	11	6	55%	5	45%	0	0%		Planned: US 89 MP 421 SB DMS Sign, Arizona Statewide Dynamic Message Sign Master Plan, 2011 (ADOT)	
89U-2	428-442	14	High	10	6	60%	4	40%	0	0%		Planned: US 89 MP 434.5 SB DMS Sign, Arizona Statewide Dynamic Message Sign Master Plan, 2011 (ADOT)	Terrain
89U-3	442-457	15	Low	3	3	100%	0	0%	0	0%		Planned: Widen Antelope Hills to five-lane undivided section (MP 442.2-442.6), US 89 Antelope Hills to Jct. US 160 MP 442 to MP 484 DCR, 2007	
89U-4	457-465	8	High	1	1	100%	0	0%	0	0%		Planned: US 89 NB: MP463 - MP 466 Passing Lane, Climbing and Passing Lane Prioritization Study, 2015 (ADOT)	Trucks using roadside parking; Lack of passing opportunities
89U-5	465-481	16	None	14	14	100%	0	0%	0	0%		Planned: - US 89 NB: MP463 - MP 466 Passing Lane, Climbing and Passing Lane Prioritization Study, 2015 (ADOT) - New Rest Area MP 465, Arizona Statewide Rest Area Study, 2010 (ADOT) - US 89 NB/SB: MP477-480 Passing Lane, Climbing and Passing Lane Prioritization Study, 2015 (ADOT) - Jct. US 160 (MP 480.8) Diamond Interchange, US 89 Antelope Hills to Jct. 160 MP 442 to MP 484 DCR, 2007	
89U-6	481-498	17	None	3	3	100%	0	0%	0	0%			
89U-7	498-524	26	Low	6	6	100%	0	0%	0	0%		Planned: - US 89 SB: MP502 - MP499 Passing Lane, Climbing and Passing Lane Prioritization Study, 2015 (ADOT) - US 89 NB/SB: MP509 - MP512 Passing Lane, Climbing and Passing Lane Prioritization Study, 2015 (ADOT) - US 89 MP 523 NB/SB Proposed DMS Sign, Arizona Statewide Dynamic Message Sign Master Plan, 2011 (ADOT)	
89U-8	524-547	23	High	24	22	92%	2	8%	0	0%			Extended closure due to landslide; Terrain; lack of passing opportunities
89U-9	547-550	3	Low	2	1	50%	1	50%	0	0%			
89U-10	550-557	7	None	2	2	100%	0	0%	0	0%	Page Port of Entry	Planned: - US 89 NB: MP550 - MP552 Climbing Lane, Climbing and Passing Lane Prioritization Study, 2015 (ADOT) - US 89 SB: MP557 - MP555 Climbing Lane, Climbing and Passing Lane Prioritization Study, 2015 (ADOT)	